M 6/ IV. b. 79.[2]
D. XIII
18/6
23,985/B/1

42 600

OBSERVATIONS

ON THE

ANIMAL OECONOMY,

AND ON THE

CAUSES AND CURE OF DISEASES.

By JOHN GARDINER, M.D.
PRESIDENT OF THE ROYAL COLLEGE OF PHYSICIANS, AND FELLOW OF THE ROYAL SOCIETY OF EDINBURGH.

Multum egerunt qui ante nos fuerunt; multum etiam adhuc reſtat operis, multumque reſtabit; nec ulli nato poſt mille ſecula praecluditur occaſio aliquid adhuc adjiciendi. SENECA, Epiſt. 64.

EDINBURGH:
PRINTED FOR WILLIAM CREECH;
AND SOLD IN LONDON BY
T. LONGMAN, J. JOHNSON, AND J. MURRAY.

M,DCC,LXXXIV.

Verwijderd K. B.
Koninklijke Bibliotheek 's Hage

WELLCOME
HISTORICAL
MEDICAL
LIBRARY

PREFACE.

THE knowledge of anatomy, ſo indiſpenſibly neceſſary to our improvement in medicine, is carried, perhaps, as far as it is capable, or is requiſite for the information of the practical phyſician or ſurgeon. Our knowledge, however, of the Animal Oeconomy has not kept pace with that of Anatomy. Medical writers have, indeed, by degrees, laid aſide the pompous diſplay of mathematical learning, ſo injudiciouſly applied in their explanations of the animal functions. They now, with propriety, conſider it more as an animated machine, or a machine endowed with ſenſibility and ſelf-moving powers, whoſe movements, though regulated by peculiar laws, are apt to be diſturbed, and rendered irregular by the action of various ſtimuli, as well as by the paſſions and affections of the mind. But, it is much to

be

be regreted, that the inquiries of phyſicians have not been more particularly directed towards the acquiſition of a greater intimacy with the internal oeconomy of our ſyſtem. Our ignorance in this reſpect has, perhaps, been the greateſt impediment to our advancement in the knowledge and cure of diſeaſes. How little do we know of the nature of the living principle? though from it alone every power and diſtinctive property poſſeſſed by us as animals are derived. We are equally ignorant of the laws by which the human ſyſtem is regulated, of the nature of general and particular ſympathies, and of many other important circumſtances, ſuch as the different effects of various ſtimuli on the body, which, when duly conſidered, will be found not only to be the cauſes of internal diſeaſes, but the principal means by which the phyſician is enabled to cure them. It muſt, indeed, be allowed, that theſe are ſubjects of difficult inveſtigation, and in which ſmall progreſs has hitherto been made. But this ſlowneſs

of

of our progreſs is not owing ſolely to the intricacy of the ſubject; becauſe men eminently conſpicuous for genius and quickneſs of apprehenſion often poſſeſs ſuch a luxuriancy of fancy as, in ſome meaſure, incapacitates them for cool and diſpaſſionate reaſoning upon facts, which are the ſureſt means of arriving at truth. The livelineſs of their imagination cannot be fettered by the tedious, but ſure rules, which lead to truth. They, of courſe, yield to the ſtrong propenſity they have for building ſyſtems upon ſuperficial and unſtable foundations. But, inſtead of elucidating their ſubject, their mode of inveſtigation involves it in additional obſcurity. Hence their ſyſtems, derived from conjecture, have not the ſupport of facts and experiments. Unfortunately, however, their ſpecious mode of reaſoning often miſleads the inexperienced ſtudent, by pleaſing his imagination, inſtead of ſtoring his mind with uſeful knowledge. For, that great diſplay of parts and learning we ſo frequently meet with,

with, in their acute but falſe manner of reaſoning, is apt to deceive, nay, even to captivate the youth of genius, whoſe diſpoſition often inclines him rather to take delight in ſuch theoretical diſquiſitions as, from their novelty and ingenuity, are more calculated agreeably to amuſe and exercise the mind, than in plain and practical diſcourſes, which, giving little exertion to the mental powers to comprehend, afford leſs pleaſure in the peruſal. Years and experience, in minds of a more ſolid and diſcerning caſt, often remove this ſlight and pernicious mode of philoſophizing. But, as we are much influenced by habit, many men, who are more remarkable for brilliancy of parts than ſolidity of judgment, continue this manner of reaſoning and judging through life. Their publications, of courſe, though they may, from the ſpecious manner in which they are written, amuſe their readers, contribute very little to the improvement of medical knowledge, or of ſcience.

In

In medical ſubjects, it muſt be confeſſed, it is extremely difficult to follow the method of induction preſcribed by Lord Verulam. The ſmall number of data we poſſeſs, prevents us from explaining phaenomena in the animal oeconomy, as well as the nature of the cauſes of ſeveral diſeaſes, and, of conſequence, their particular operation on the ſyſtem. From this circumſtance, the profeſſion of phyſic has been branded with the appellation of a conjectural art; and I wiſh moſt ſincerely, for the benefit of mankind, that phyſicians could, in ſome meaſure, remove the aſperſion. I have not the preſumption to imagine that it will be in my power to accompliſh this deſirable effect. All I can hope for, from the following obſervations relative to the animal oeconomy, and the cauſes and cure of diſeaſes, is, in particular inſtances, to leſſen the odium, by avoiding, as much as poſſible, all theoretical ſpeculations, being thoroughly ſenſible, that it is only from facts and obſervations, carefully made,

made, and candidly related, that we can ever expect to obtain any satisfactory information on such subjects.

The following dissertations are not meant as a regular treatise on the Animal Oeconomy; such a task is too extensive for my abilities. In many particulars relating to it I must confess my ignorance. I only touch on such parts of that subject as I think have not been sufficiently attended to by medical writers, and which, when duly considered as they really exist under the various conditions of health and disease, may assist us considerably in our explanations of certain morbid states of the body that are proposed as introductory to an examination into the causes and cure of diseases.

EDINBURGH, Oct. 21. 1784.

CONTENTS.

CONTENTS.

SECTION I.

OF THE LIVING PRINCIPLE IN ANIMALS.

Paragraph		Page
1.	*Introduction*	1
2.	*Definition*	3
3.	*Principal seat of the living principle*	4
4.	*Faculties of the mind exercised in the brain*	4
5.	*Brain glandular. Secretion in the brain. Its use*	8
6.	*The living principle too subtle to be confined in vessels*	9
7.	*Of the nerves. Their power as conductors*	10
8.	*The living principle greater in quantity and in power, in certain conditions of the brain and nerves*	11

Paragraph Page

9. *Standard point of heat in the body* 12
10. *Power of reſiſting the effects of heat and cold* . 12
11. *Power of regulating the ſtandard point of heat* . 13
12. *Firſt vital function* . 13
13. *Sympathy between the heart and lungs* . . 14
14. *Part of the living principle in the blood* . . 17
15. *And preſent in every part of the body* . . 18
16. *and* 17. *The living principle muſt be acted on, otherwiſe its powers decline* . 22—24
18. *Effects of the palſy on the ſyſtem* 25
19. *Senſibility of the nerves in youth, ſtability in manhood, and gradual decay of their ſenſibility in old age* . . 26
20. *Solvent power of the gaſtric menſtruum on the dead, but not on the living fibre* . . 28

21. *Hunger*

Paragraph Page

21. *Hunger from the action of the gastric fluids on the nerves of the stomach* . . . 30

22. *Stimulus from the digestion of our food gives strength and firmness to our actions* . . . 30

23. *Accumulation of the powers of action from diet and rest* . 31

24. *Moderate exercise of mind and body invigorate both* . 32

25. *Immoderate exercise of them diminishes and exhausts the powers of action* . . 33

26. *The power of habit in the action of particular muscles* . 34

27. *Strength of body, but diminution of capacity from habitual hard labour* . . 36

28. *Improvement of the mind depends on the degree of exercise given to the mental faculties. But debility of the body is the consequence of a studious and sedentary life* 37

29. *Powers*

Paragraph Page

29. *Powers of life, in respect to strength, various, but health and life equally well supported in most cases* . . 39

30. 31. 32. *and* 33. *Passions of the mind, their effects on the system* 39—43

34. *Part of the living principle present in every part of the body, and remains with them for some time after death or separation* 43

35. *Heat and moisture necessary for maintaining the powers of the living principle* . 45

36. *Previous to death in consequence of certain fevers and chronic diseases, there is a gradual exhaustion of the principle of life in every part* . 47

SECTION

SECTION II.

OF THE NERVES, OF SYMPATHY, AND OF STIMULI.

Paragraph Page

39. *Nerves the conductors of the living principle, and the medium through which it is acted on* 53

40. *Unity of substance with the brain, the probable cause of general sympathy* 56

41. *and* 42. *The effects of stimuli various* 57—62

43. *Remarkable sympathies* . 65

44. *Salutary stimuli* . 67

45. *Noxious stimuli* . 67

46. *From habit certain stimuli may be born with impunity. The ultimate effects of stimuli not always observed on their removal* 68

47. *Stimuli,*

Paragraph Page

47. *Stimuli, without any ſenſible irritation, are capable of producing conſiderable changes* . 69
48. *Action of inconſcious ſtimuli* 71
49. *The ſkin moſt liable to be affected, from the viciſſitudes of heat and cold*, &c. . . 73
50. *Stomach and bowels ſubjected to a great variety of ſtimuli, of which we remain inconſcious* . 74
51. *Diſtant parts affected from ſtimuli applied to the ſtomach and bowels* . . . 77
52. *and* 53. *Fainting from general ſympathy with the parts affected* 81—83
54. *Fainting, and ſometimes death, in conſequence of a blow on the ſtomach*, &c. *The effects of opium and of pain* . . 84
55. *Effects of pain in proportion to the vigour of mind employed to reſiſt its power* . . . 86
56. *Reciprocal ſympathy between the mind and body* . 87

57. *Chronic*

Paragraph Page

57. *Chronic diſeaſes are ſometimes ſuſpended by a ſudden and uncommon excitement of the mind* 88

58. *In certain chronic diſeaſes, if the mind is employed, a more equal diſtribution of the powers of action takes place* 90

59. *Operation of opium* 92

60. *and* 61. *Of poiſons* 93

62. 63. *and* 64. *Action of opium ſedative. Vinous ſpirits kill by an exceſs of cordial ſtimulus* 95

65. *Of the lauro-ceraſus* 98

66. *Diſſections afford no information as to the operation of vegetable poiſons* 99

67. *Of mechanical preſſure and ſpecific ſtimuli* 101

68. *A variety in the ſpecies of ſenſibility and irritability of the nerves in different parts* 102

69. *and* 70. *Chiefly from their manner of terminating, and particular apparatus*

Paragraph Page

apparatus given to fit them for their different offices 104—107

SECTION III.

OF THE EFFECTS OF HEAT AND OF COLD.

71. *to* 79. *A short abstract of Dr Crawford's theory of respiration and source of animal heat, with observations on that theory* 109—120

80. *A constant generation and consumption of heat in the body* 121

81. *Most evident after birth* 121

82. *Process of incubation* . 122

83. *Standard heat regulated by the powers of the living principle* 125

84. *Powers of life depend on, or are connected with, a certain degree of heat in the body* . 127

Paragraph Page

85. *and* 90. *Standard heat regulated with the leaſt fatigue in a temperate air* . 128. *and* 137

86. *In proportion to the heat applied, the pulſe quickens and perſpiration increaſes* . . . 131

87. *Quantity of heat generated correſponds with the velocity and force of the circulation. Sweating, the principal means for carrying off the ſurplus quantity of heat* 131

88. *Human body receives heat,* ab extra, *very ſlowly* . . . 133

89. *Cooling effects of evaporation* 135

91. *An accumulation of heat above the ſtandard exhauſts proportionably the powers of life* 140

92. *An accumulation of heat prevents the effects of cold air for ſome time* 143

93. *Manner of preventing a catarrh in perſons overheated* . 145

Paragraph Page

94. *Animal heat regulated by a power in the living body* . . 148
96. *Effects of cold on animals subject to torpidity* 149
97. *Manner in which the effects of cold air is counteracted for some time* 152
98. *Below the natural temperature, the powers of life keep pace with the low degrees of heat* . 154
99. *Necessity of regulating the standard heat in the cure of diseases* 156
100. *Power of custom in enduring degrees of heat and cold* . 157
101. *and* 102. *Health, longevity, and vigour of mind most remarkable in temperate climates* 159—161
103. *Diseases arising from an excess of cold* 165
104. *Diseases arising from an excess of heat* 167

SECTION

SECTION IV.

OF FEVERS IN GENERAL.

Paragraph Page
105. *General cauſes of fevers* . 168
106. *Cauſa proxima of fevers difficult to be traced* . . . 171
107. *Chiefly from our not attending ſufficiently to the internal oeconomy of our ſyſtem* 173
In the note to this is, dogmatiſts and empyrics—their character.
108. *Diviſion of fevers* . . 179
109. *Fevers from marſh miaſma* . 180
110. *Marſhy and fenny grounds not the ſole ſource of marſh miaſma* 183
111. *and* 112. *Fevers from human contagion* . . . 184
113. *Similitude between the jail, hoſpital, and malignant fevers* . 187
114. *Contagion in general exerts itſelf with various degrees of power* 189
115. *Different*

Paragraph Page

115. *Different ways in which contagion is supposed to affect our system* . . . 190
116. *By the pores of the skin* . . 191
117. *By respiration* 191
118. *By inoculation* . . . 194
119. *By the saliva* . . . 196
120. *Matter of contagion acts as a ferment in the primae viae* . 196
121. *Inoculation, its progress* . 198
122. *Varies in malignancy according to the part to which the infection is applied* 200
123. *It acting as a ferment in the primae viae, adds to the malignity of the disease* . . . 201
124. *Probable cause of its difference in malignancy* 202
125. *Cold, its effects in repressing the fever* 204
126. *Action of the cause first on the primae viae* 207
127. *Proofs*

Paragraph Page

127—133. *Proofs that infection in general is taken in with the saliva, that the primae viae are first affected, and that, by emetics timely given, fevers are often prevented* . . . 210—222

134. *Remarkable effect of the vapour of putrid swamps from Lancisius and Dr Lind* . . . 225

135. *Proof from sympathy of the primae viae being first affected by the cause of fevers* . . . 229

136. *Little instruction from meteorological tables* 232

136—139. *Common continued fevers not infectious, but become so from foul air; and from these infectious fevers arises a considerable variety of specific contagion* 232—234

SECTION

SECTION V.

OF A CATARRH.

Paragraph Page

141. *Influenza, &c. distinct diseases from a simple catarrh* . . 238

142. *Common idea of the cause of a catarrh* 239

143. *and* 144. *Stoppage of perspiration not the cause of a catarrh* 239—241

145. *Sympathy between the skin and lungs on the application of cold to the former* 245

146. *Ditto and anodyne effects of the warm pediluvium* . . 246

147. *The operation of cold, salutary or noxious, according to its intenseness or time of application* . 249

148. *If cold applied to the body is so intense as to diminish the power of the nerves as conductors, disease takes place* 250

149. *The*

Paragraph Page

149. *The cauſes of diſeaſes act for ſome time before the ſyſtem in general is ſenſibly affected by them* . 250

150. *The morbid effects of cold ſlow and imperceptible* . . . 252

151. *Nature and cauſe of the cough* 253

152. *Mucous glands of the ſtomach affected in coughs of ſome ſtanding* 275

153. *Former diſeaſes give a particular turn to the action of the cauſe of a catarrh* . . . 275

154. *and* 155. *Fit of the ſtone and other diſeaſes from cold* . 259

156. *Tubercles in the lungs and phthiſis pulmonalis* . . . 261

157. *and* 158. *Habitual coughs from large ſecretions of phlegm, without any acceſſion of cold* . 262

159. *A catarrh from an exceſs of ſtimulus, and general ſympathy with the parts firſt affected* . 263

160. *A preternatural irritability of the ſyſtem, particularly in the ſeat of the mucous glands* . . 266

161. *Curative*

Paragraph Page
161. *Curative indications* . . 267
162. 1*mo*, *To take off all tendency to inflammation* . . . 267
163. *Veneſection, its effects on the ſyſtem. Bliſters, their effects* . 268
164. 2*do*, *To free the ſyſtem from preternatural irritability; and*, 3*tio*, *To rectify the morbid ſecretions of the mucous glands* . 270

SECTION VI.

OF A CATARRHAL FEVER.

166. *Catarrhal fever of a middle nature between a catarrh and inflammatory fever* . . . 275
167. *Cauſa proxima of fevers* . 276
168. *Catarrhal fever of autumn* 1758 279
170. *Common continued fever* . 281
172. *Arterial ſyſtem and mucous glands chiefly affected from cold* . 283

173. *Return*

Paragraph Page
173. *Return of former diſorders from cold* 284
174. *Cauſes of diſeaſes may act for ſome time without any apparent injury to the body* 285
175. *Acceſſion of the fever* . . . 287
176. *From a febrile ſtimulus in the ſtomach and bowels, and an increaſed irritability of the ſyſtem* . 289
177. *Rationale of ſymptoms* . . 292
178. *Cold ſtage* . . . 294
179. *Hot ſtage* 295
180. *Ditto, and relative to critical days* 298
181. *Cold ſtage not the cauſe of a fever, nor perhaps eſſential to it* . 300
182. *Exacerbation of the fever in the evening* 303
183. *Similarity in reſpect to the cauſe of a catarrh and catarrhal fever* 305
184. *Method of cure pointed out by nature* 308
185. *Cold air, cold drink, &c.* . 310
186. *Veneſection, bliſters, &c.* . 311

Paragraph Page.

187. 188. *and* 189. *Emetics, cathartics, and antimonials* . 314—318

190. *General management during the courſe of the fever* . . 321

191. *Criſis* 323

192. *and* 193. *Materies morbi generated during the courſe of the fever* . . . 323—325

194. *Maturation and evacuation of the morbific matter* . . 327

195. *Urine, clouds in it previous to the criſis, and critical diſcharges* 331

SECTION VII.

OF THE CHOLERA.

197. 198. *and* 199. *Heat the remote cauſe of the cholera* . 336—338

200. *and* 201. *Effects of heat in warm climates. Deſcription of the cholera* . . 339—342

202. *Mag-*

Paragraph Page

202. *Magnitude of the diſeaſe in proportion to the heat of the ſummer, climate, exerciſe, &c.* . 342
203. 204. *and* 205. *The cure* 344—347
206. *Schirrous obſtructions in the liver.* 348

SECTION VIII.

OF THE BILIOUS, REMITTING, AND INTERMITTING FEVER.

207. *Deſcription of the diſeaſe* . 350
208. *Magnitude of the diſeaſe in proportion to the heat and moiſture of the climate or ſeaſon* . 352
209. *Its various forms* . . 355
210. *The ſeveral forms of the diſeaſe change into one another* . 355
211 *General cauſes of fevers often concerned in the production of the bilious fever* . . 362
212. *Inflammatory ſpecies* . . 363
213. *Acceſſion*

Paragraph Page

213. *Acceſſion more ſtrongly marked than in the catarrhal fever* . 365
214. *Remiſſions more diſtinct than in the catarrhal fever* . 366
215. *Indications of cure* . . 368
216—219. *Difference of opinion in reſpect to veneſection* . 369—374
220. *Emetics and laxatives* . 375
221. *Some time is required before the effects of the cauſes can be removed* . . . 377
222. *General plan of recovery* . 378
223. *Tartar emetic as a gentle emetic and laxative* . . 380
224. *Saline draughts, their uſe* . 383
225. *An increaſed ſecretion of bile during the fever* . . 384
226. *and* 227. *Laxatives and antimonials, their uſe. Dr James his notion of fevers* . . 387
228. *Nature of antimonial preparations* 391
229. 230. *The compoſition of one ſimilar to that of Dr James's* 393

231. *and*

Paragraph Page

231. *and* 232. *Time and manner of giving the bark* . . 397
233. *Neceſſity of ſometimes clearing the primae viae in the advanced period of fevers* . . . 400
234. *Management of cordials* . 402
235. *Antiſeptics, cleanlineſs and freſh air* 403
236. *Cure of delirium, various* . 205
237. *Anomalous ſymptoms, their treatment* 406

SECTION IX.

OF INTERMITTENTS.

238. *and* 239. *Fevers from marſh miaſma, various* . . 408
240. *Paroxyſm of an ague* . . 411
241. *Denomination of intermittents* 414
242. *Marſh miaſma, its effects on the primae viae* . . 416
243. *Effects of emetics ſimilar to the cold fit of an ague* . 418

Paragraph		Page
244.	*Cold ſtage*	420
245. *and* 246.	*Hot ſtage*	421
247.	*Sweating ſtage*	424
248.	*Periodical return of the paroxyſms*	425
249.	*Similitude amongſt fevers obſerved by authors*	427
250.	*Preſent plan of cure, empyrical*	429
251.—254.	*Evidence of the foregoing theory from the cure*	430
256.	*Laudanum, its uſe in intermittents*	433
257. *and* 258.	*Bitters, aſtringents, and the bark, their operation in the cure of intermittents*	435
259.—262.	*Manner of giving the bark*	439
263.	*Noſtrums*	446
264. *and* 265.	*Cure by laxatives*	447
266.	—— *by aſtringents*	451
267.	—— *by laudanum*	452
268 *and* 269.	—— *by camphire*	453
270.	*The different methods of cure throw conſiderable light on the foregoing theory*	456
271.	*Prophylactics*, &c.	457

ERRATA.

ERRATA.

Pag. 132. lin. 8. *For* when heated, *leg.* when the body is heated.

—— 153. — 1. *For* any air, *leg.* an air.

—— 182. — antepen. *For* and bilious fevers, *leg.* when bilious, &c.

—— 321. — 1. *For* alkalis, *leg.* alkalies.

OBSERVATIONS

ON THE

ANIMAL OECONOMY.

SECTION I.

OF THE LIVING PRINCIPLE IN ANIMALS.

1. IN our researches into the oeconomy of Nature, it seldom happens that we can proceed farther than to enumerate a few facts relative to the subject under consideration. To trace the causes of particular operations often exceeds our limited powers; and, in no case, can this observation be

more ſtrongly verified than in our attempts to inveſtigate the qualities and powers of the living principle in animals. Difficulties of this kind have, probably, deterred many ingenious men from entering on a ſubject ſo ſubtile, which, if they had proſecuted with ardour, might have carried their inquiries much farther than I can pretend to reach. With regard to the cauſes themſelves, therefore, I ſhall paſs them over as impenetrable ſecrets. If even a ſuperficial account of the little we know concerning this intricate ſubject can afford us the ſmalleſt information relative to the internal oeconomy of our ſyſtem, of which we always have been ſo ignorant, ſome additional light may be thrown on the nature of ſeveral diſeaſes, and a more ſatisfactory explanation of ſome uncommon ſymptoms attending them, than has hitherto been given, may ariſe from ſuch diſquiſitions. Another circumſtance merits our attention. In the hiſtory of diſeaſes, and in giving the *rationale* of ſymptoms, medical writers are under a neceſſity

neceſſity of having recourſe to certain affections of the nerves, by which, no doubt, the living principle is acted upon. Of courſe, though there is little reaſon to alter our language on ſuch occaſions, yet I could wiſh to inculcate a diſtinction between the inſtruments of conveyance and the powers themſelves. Conſiderations of this kind lead us to a more diſtinct view of the true nature of certain diſorders, and, of courſe, to a more rational management and cure of them. I ſhall, therefore, with much diffidence, offer ſome obſervations on this moſt intereſting ſubject.

2. By the living principle is underſtood that power which, in an animal, actuates its whole ſyſtem, or from which is derived ſenſation, motion, and life; it is the cauſe of the preſervation of the body from diſſolution, and is capable of exiſting for ſome time under a ſuſpenſion of all its actions *.

3. Though

* As the qualities and properties of particular bodies are

3. Though the influence of the vital principle extends to every part of the body, yet its principal ſeat and the great ſource of all its powers ſeem to be diffuſed through the ſubſtance of the brain, cerebellum, and ſpinal marrow, but not limited to any particular part of them.

4. In the human ſpecies, the brain, cerebellum, and their appendages, are ſo much larger in proportion to the body than in any other animals of the ſame ſize, that we muſt conclude them to ſerve ſome other purpoſe in the ſyſtem, than merely to give origin to the nerves, the ſum of whoſe diameters bears no proportion to the quantity of brain contained in the cranium. It is not, therefore, unreaſonable to conclude the brain to be the organ in which the faculties of

are ſeldom peculiar to them, but common to others, this makes clear and diſtinct definitions the moſt difficult of all compoſitions: Even what I have here given may admit of ſome cavil, as applicable, in ſeveral reſpects, to the living principle in vegetables.

of the mind are exercised, and the magazine or chief seat of the living principle, from whose powers all the functions of the body are derived. My learned and ingenious friend Dr Alexander Monro, to whose judgment in physiological subjects I pay the greatest regard, appears to be of the same opinion. In his excellent book on the Structure and Functions of the Nervous System, he expresses himself as follows: 'Suppose we make a horizontal section of 'the brain, where its hemispheres are join-'ed together in the corpus callosum, we 'divide a mass of medullary substance, 'which is an hundred times, at least, as 'bulky as all the nerves of the head and 'spinal marrow conjoined. So that, unless 'we are to conceive that a hundred me-'dullary fibres of the brain concur in form-'ing a single nervous fibre, we must con-'clude that a great part of the machinery 'of the brain serves some other purpose.

'Besides, it may be observed, that many 'medullary fibres of the brain appear,

'from

'from their direction, better calculated to 'connect the different ſides and different 'parts of the brain to each other, than to 'connect the brain to the nerves. Thus, 'we obſerve tranſverſe bundles of fibres in 'the corpus calloſum, the commiſſura cere-'bri anterior and poſterior, the tuber an-'nulare, and even in the medulla oblon-'gata.

'Further, it is obvious, and has been 'long and repeatedly obſerved by anato-'miſts, that fiſhes, and other animals with 'very ſmall brains, feel as acutely, and ex-'erciſe their muſcles as violently, as the o-'ther claſſes of animals, in which the brain 'is proportionably much larger.

'In the laſt place, the human brain ſo 'greatly exceeds, in proportional ſize, the 'brain of the other animals of the ſame 'claſs, that I have found the brain of a 'large ox not to weigh more than one 'fourth part of the human brain, whilſt 'the weight of the ox was, probably, ſix 'times greater than that of the man; or

'the

'the brain of the man was, in proportion 'to his weight, twenty-four times heavier 'than that of the ox; at the ſame time, 'the nerves of the muſcles of an ox are, in 'their ſize, proportioned to the bulk of his 'muſcles; and thoſe of the organs of his 'ſenſes, as the eye and noſe, are propor- 'tioned to the extent of theſe organs; thus, 'the olfactory nerve of an ox is many 'times larger than that of a man. Hence 'we are led to conſider the brain as a me- 'dium between the mind and the reſt of 'the body of the animal, by the interven- 'tion of the machinery of which the in- 'tellectual powers are influenced, in a way 'we neither do, nor, probably, ever ſhall 'be able to comprehend: And that, in 'man eſpecially, a ſmall part only of it is 'lengthened out, ſo as, in the common 'way of ſpeaking, to give origin to the 'nerves*.' The Doctor afterwards ſhews, from

* Obſervations on the Structure and Functions of the Nervous Syſtem, p. 24.

from diſſections, that the nerves may exiſt with their full powers, independent of the brain, and concludes, 'That a ſmall portion 'only of the brain, eſpecially of the human, 'is elongated in order to form the nerves 'and ſpinal marrow. That the reſt of it, 'as a medium between the living principle 'and the other parts of the body, performs 'offices which are proper to it. That the 'oppoſite ſides of the encephalon are join-'ed by bundles of fibres, ſo that we ſeem, 'in a certain degree, to perceive the cauſe 'of the ſufferance of all parts of the ner-'vous ſyſtem with that of any one part 'of it, or of the general ſympathy of 'nerves *.'

5. It has been ſuppoſed that the cortical or cineritious part of the brain is of a glandular nature; but for what particular purpoſe the ſecretion is there performed, anatomiſts

* Obſervations on the Structure and Functions of the Nervous Syſtem, p. 26.

tomiſts and phyſiologiſts have not hitherto determined; though it is probable, that, beſides the lymph found in the ventricles, which moiſtens the general contents of the encephalon, there is a particular ſecretion deſtined for the growth and nouriſhment of the brain and nerves, and for affording a proper degree of moiſture to them, which ſecretion does not ſeem to be confined to the brain and cerebellum, but appears to go on in the ſpinal marrow, and even in the nerves themſelves, from their origin to their termination. This ſuppoſition is greatly ſupported by the number of blood-veſſels ſpread on their coats.

6. I can eaſily conceive a fluid to be ſecerned for the purpoſes juſt mentioned, but cannot admit the idea of an animal ſpirit being ſeparated from the blood, and circulated through the brain and nerves for the purpoſes of motion, ſenſation, and life. This would be a ſecretion of the living principle itſelf, which is an abſurdity. The

living principle ſeems to exiſt in a collected ſtate through the brain and its appendages. It likewiſe pervades the medullary ſubſtance of the nerves through their whole length; but its nature is too ſubtile to be confined in veſſels.

7. The medium through which the powers of the living principle are conveyed to all parts of the body, are the nerves originating from the brain, cerebellum, and ſpinal marrow. The nerves conſiſt of a ſmall portion of the medullary ſubſtance of theſe parts, each appearing to be a bundle of ſmall filaments connected by a cellular membrane. The whole cord is covered, from its leaving the ſkull or vertebrae, with two membranes which reſemble the dura and pia mater, until it terminates in a particular part, or by its diviſion and ſubdiviſion into ſeveral parts of the body where theſe *involucra* are ſuppoſed to be thrown off, it being thought neceſſary by moſt medical writers that the medullary part of each filament

filament ſhould be laid bare at its termination, for the performance of its office in the oeconomy. But it does not appear to be true with reſpect to theſe ultimate fibres of the nerves. That very able and accurate anatomiſt Dr Alexander Monro gives the moſt ſatisfactory reaſons for their being covered with a production of the pia mater; which not only gives them a proper degree of ſtrength, but, from the veſſels of this delicate covering, they appear to receive their nouriſhment, and to have thoſe conditions preſerved on which their faculties, as conductors of the living principle, ſeem chiefly to depend.

8. The living principle appears to become more conſiderable in quantity and power in certain conditions of the brain and nerves; but how this happens muſt, perhaps, ever remain a ſecret to us. Reſearches of this kind, which exceed the limits of our capacity, have bewildered the imagination of phyſiologiſts and philoſophers,

phers. They ſhould have contented themſelves with the knowledge of the fact, without preſuming to expiſcate the cauſe, over which Nature appears to have drawn an impenetrable veil.

9. It appears to be a law in the human ſyſtem, that a certain ſtandard point of heat, from 96 to 98 of Farenheit, ſhould be maintained in it, by which the power of the living principle is chiefly ſupported.

10. The living principle ſeems to poſſeſs a power of reſiſting the effects of heat and of cold to a certain degree. But, when the body becomes a few degrees warmer or colder than its natural ſtandard, the principle of life is proportionably weakened; and, if this increaſe or abatement of heat goes on a little farther, life is totally extinguiſhed *.

11. Hence

* Vide the effects of heat and cold, ſect. iii.

11. Hence (parag. 9. 10.) it follows, that a certain degree of heat muſt be coeval with the living principle, which it endeavours to adjuſt with great preciſion, the extent of its powers depending in a great meaſure on this exact regulation of heat.

12. Though the principle of life muſt exiſt from the time of conception, yet the firſt vital motion obſervable is the punctum ſaliens, or beginning of the heart's motion in the chick: And, from the ſtricteſt analogy, we may infer that the alternate contraction and dilatation of the heart is the firſt vital function in the human foetus. As the foetus becomes gradually more perfect in its figure, and in the ſtructure and configuration of its organs, the vital principle proportionably gains ſtrength. From this early motion of the heart in the foetus, it has always been conſidered as a principal organ in every perfect animal. With it commences the firſt regular circulation of the blood, on which the growth and nouriſhment

riſhment of the animal, the ſeveral ſecretions, and other operations in the oeconomy, chiefly depend.

13. It is not probable, that, in the foetus, there is any remarkable ſympathy between the heart and lungs. But, immediately after birth, when all connection between the mother and child is at an end, and a new circulation takes place through the lungs, the ſympathy between theſe two organs becomes ſo remarkable, that it appears as if the action of either could not exiſt ſeparately *. For, unleſs reſpiration is brought on, the motion of the heart ceaſes, and there is a ſuſpenſion of the vital functions for ſome time, though the living principle ſtill exiſts in the body. In which caſe they

* If, by blowing air into the lungs of animals ſeemingly dead, reſpiration can be reſtored, the action of the heart is thereby recovered. Mr Hook, Philoſoph. Tranſ. v. ii. p. 539. Toſſach. Med. Eſſ. v. 6. p. 108. Dr Langriſh, Cron. Lect. p. 61. and 62. Mr J. Hunter, Phil. Tran. v. 66. part 2. p. 417.

they are recoverable, by blowing air into the lungs, and the application of other gentle ſtimuli to the ſyſtem; and as ſoon as reſpiration commences, the motion of the heart is renewed. The ſame thing happens at any after period, when a ſtop is put to the motion of the lungs by a perſon breathing the fumes of burning ſulphur, mephitic air, &c. or by being under water ſo long as to ſtop reſpiration, which is always ſucceeded by a ceſſation of the motion of the heart. But the heart may again be brought to act, if reſpiration can be renewed, and not otherwiſe: For, if the ſuſpenſion of the vital motions continues till the living principle is extinguiſhed, the powers of action being thus deſtroyed, the actions themſelves muſt be for ever irrecoverable. This very intimate connection between theſe two vital motions is, perhaps, the moſt ſurpriſing that exiſts in the animal body, and which it is impoſſible to account for, by any mechaniſm of parts or connection of nerves. Their dependence on the pow-

ers

ers of the living principle is in common with the other bodily actions. But this remarkable circumſtance is obſervable with reſpect to their motions, that, when the powers of life are ſo far exhauſted as to occaſion an abolition of all other action, theſe ſtill, in ſome degree, for a time, ſubſiſt, eſpecially in the more perfect animals, and a ceſſation of them is always the ſign of death. On the other hand, when the powers of life are in their full vigour, if reſpiration is, by any means, ſuddenly ſtopped, and, of courſe, the motion of the heart, though it does not appear that any mortal injury is done to either organ; yet, from that inſtant, the powers of life gradually decline, and are, in a ſhort time, aboliſhed, which has every appearance as if the connection between the living principle and the body were kept up by the vital motions alone. But, although the effects of reſpiration and of the circulation of the blood are moſt remarkable in maintaining this connection, yet we know, that a certain

tain degree of heat, arising chiefly from the vital motions, is indispensably necessary. Nature appears to diffuse this heat equally through the body by means of the circulation. And there may be other circumstances, which, from their less obvious effects, we are ignorant of, all concurring to produce the same end. But respiration, the circulation, and heat, appear to be the principal bonds by which the union of the principle of life with the body is maintained. It is true, that Nature assumes some latitude in her operations, without injury to the body. But, when either of the vital functions, or the heat of the body, deviate considerably from their natural healthy state, the powers of life are proportionably diminished.

14. The ingenious and accurate anatomist Mr John Hunter of London, considers part of the living principle to be inherent in the blood, which, he says, is founded on the result of many experiments. Of

this gentleman's abilities and candour, I have the higheſt opinion. His proofs, in general, are concluſive on other ſubjects; but, being unfortunately unacquainted with his experiments on this ſubject, I can only mention ſuch evidence of his doctrine as at preſent occurs to me.

15. The general debility brought on the ſyſtem by repeated veneſection, the great proſtration of ſtrength, and even death, produced by haemorrhages, when the evacuation of blood is conſiderable and ſuddenly made, muſt be conſidered only as a preſumptive proof of part of the living principle being inherent in the blood; becauſe theſe effects may be otherwiſe accounted for. But, that blood ſhould circulate in our bodies 100 degrees warm, for ſo conſiderable a time as it muſt continue in circulation before it can be completely renewed, without ſuffering any material change, which cannot be preſerved from corruption, in ſuch a degree of heat, when

out

out of the body for a few hours, muſt be owing to the preſence of the living principle. This principle, while it remains unimpaired, preſerves all animal ſubſtances from diſſolution, and explains the queſtion of the learned Sanctorius, ('Caro animata 'cur vivit et non putreſcit ut mortua? quia 'quotidie renovatur *),' but in a different way, and, as I apprehend, in a more ſatisfactory manner than appears, by the above aphoriſm, to have occurred to that ingenious and uſeful philoſopher, from his not attending ſufficiently to the powers and properties of the principle of life; for, although we are every day nouriſhed by a ſucceſſion of freſh chyle, which by the circulation, and other operations in the oeconomy, is, for that purpoſe, ſoon changed into blood, yet, the part of the body, in this way renewed, muſt, in reſpect of the whole, be exceedingly ſmall, and cannot account for the preſervation of the body from putrefaction

* Static. Med. Sect. i. Aphor. LXXX.

trefaction for one day, far leſs for the period which muſt elapſe before the ſeveral parts of the body can be renewed. The ſame argument holds good, not only with regard to the ſolids, but to the liquors ſecreted from the blood. Theſe fluids could not otherwiſe be preſerved in the cellular ſubſtance, and other parts, in a ſtate of ſtagnation for any conſiderable time, without undergoing ſuch changes as muſt prove hurtful to the ſyſtem. Indeed, the influence of this aſtoniſhing antiſeptic power of the living principle is extended even to the contents of the ſtomach and bowels, as appears from the production of ſo bland a liquor as the chyle by the proceſs of digeſtion, and alſo from the preſervation of the ingeſta from putrefaction after a detention in a heat of 100 degrees for twenty-four hours, ſometimes for ſeveral days. At the ſame time, it muſt be allowed, that, when the remains of our food arrives at the beginning of the colon, it then puts on its ſtercorious form, moſt probably from a putrefactive

trefactive fermentation; but the foeces never become, in conſequence of this, abſolutely putrid, whilſt they remain in the body, unleſs in morbid ſtates of the bowels. From this univerſal diffuſion of the living principle, not only through the ſolids, but fluids of the body, that principle of life which, is coeval with the *animalcula in ſemine* *, probably ariſes. A gradual increaſe of

* The celebrated M. le Count de Buffon has certainly miſapplied conſiderable talents and time in his fruitleſs endeavours to explain the nature of his living incorruptible organic particles, the manner in which ſeminal fluids are generated, their effects on each other, on their mixture of the male and female ſemen *in utero*, the difference in different animals, their capability, under certain circumſtances, of propagating the ſpecies in which they were formed, exactly ſimilar to the parents, from an internal mould, &c. I never had penetration enough to comprehend this theory. Perhaps it is incomprehenſible; and if ſo, no other can expect to meet with greater ſucceſs in their attempts to inveſtigate a proceſs ſo dark and ſo myſterious. But we have this to comfort us in our ignorance, that it is highly probable, however we might be entertained or amuſed

of the ſame principle, both in quantity and in power, is acquired during the time of geſtation. How this happens, is a queſtion of great difficulty. The living body being replete with this principle, is there a ſupply of it from the mother during the tender ſtate of the foetus; and does it increaſe with the gradual perfection of the organs, and with the increaſe of the ſtrength of the body? This ſeems to be the caſe in the progreſs from childhood to manhood.

16. The living principle which actuates the whole ſyſtem, by means of the nerves, muſt itſelf be acted on, otherwiſe it loſes its

amuſed with ſuch knowledge, it would not be of the ſmalleſt advantage to mankind. It is enough for us to know that animals and vegetables have, from the creation of the world, propagated their ſpecies, and will go on to do ſo while this univerſe ſhall continue in its preſent ſtate. So far our knowledge is of real uſe; but to perplex ourſelves with ſuch idle ſpeculations, muſt always obſtruct the progreſs of every ſpecies of natural knowledge.

its vigour, becomes languid, and is at laſt extinguiſhed. The nerves are alſo the medium through which it is acted upon. Were it poſſible to remove all ſtimuli from the nerves, or to render them inſenſible to every ſtimulus, the living principle would neceſſarily loſe its ſtrength, and its weakneſs would be in proportion to the extent of the nerves rendered inſenſible, or the time they continued in that ſtate. This inſenſibility of the nerves may be brought about by opium, the fumes of burning charcoal, intenſe cold, or other means. Theſe, by degrees, leſſen the ſenſibility of the nerves, and ſuſpend the animal actions; lethargy takes place, and the only remaining ſigns of life are the vital motions of the heart and lungs; which, by the continued action of the opium, the fumes of burning charcoal, or intenſe cold, &c. are at laſt ſuſpended. From the commencement of theſe effects upon the nerves, until a total ſuſpenſion of all action takes place, the

living

living principle gradually becomes weaker, and is at laſt extinguiſhed.

17. But it does not appear that the principle of life is deſtroyed along with the vital functions. On the contrary, it remains in the body ſome time after the heart and lungs have ceaſed to act; and, although it declines in ſtrength every moment after that period, yet, while it remains in the body, it is capable of being ſtimulated to a renewal of theſe actions, as happens ſometimes to people who have apparently breathed their laſt, but have been made to move in bed, and cry out, on being rouſed by a ſudden noiſe. But this appears more evidently in the caſes of perſons ſeemingly drowned. For, if the ſuſpenſion of the vital motions has only ſubſiſted for ſo ſhort a time, that the principle of life remaining in the body is ſtill capable of being ſtimulated into a renewal of theſe actions, then there is ſome chance of recovery. But, if the motion of the

the heart and lungs has ceaſed for a conſiderable time, and the living principle has become ſo languid as to be incapable of being ſtimulated again into action, then every function depending on its powers muſt be for ever loſt.

18. The effects of the palſy on the human body are ſomewhat ſimilar to thoſe juſt mentioned. The cauſes, indeed, are different; for, in proportion to the extent of the nerves affected, and the degree of inſenſibility brought on them, the memory, comprehenſion, and judgment fail, the animal actions loſe their ſtrength; and, when this diſeaſe advances ſo far as to produce an apoplexy, the only remaining actions in the body are the vital, which, for the moſt part, are carried on for ſome time, with an appearance of great vigour, but, from the languid ſtate of the living principle, their powers are ſoon exhauſted.

19. During the growth of the body, the ſenſibility of the nerves, and their faculty of conducting the powers of the living principle to their termination, are greater than when the body has acquired its full dimenſions. In like manner, the animal actions are performed with more eaſe and freedom, and can be repeated oftener without fatigue. This ſtate of the body is, in general, accompanied with a frolicſome chearfulneſs of mind, whilſt the ſtrength and vigour of the mental faculties are increaſing by ſlow degrees. Nor do they arrive at the full extent of their powers till ſome time after the growth of the body has ceaſed. During all this time the body is acquiring more firmneſs and ſteadineſs in its actions, though it is loſing in proportion that promptitude for motion it poſſeſſed while in a growing ſtate. In this enjoyment of the full powers of mind and body we continue for ſome years. But the body gradually loſes that agility and ſpring which it formerly enjoyed. We become ſlower

in

in our motions, and leſs fit for thoſe exerciſes which afforded ſo much pleaſure in our youthful days. This inaptitude of the nerves for conveying the powers of the living principle increaſes as age advances. By ſlow degrees we arrive at the ſhuffling ſtep of old men. Sight and hearing fail, and the nerves become, at laſt, incapable of receiving ſuch forcible impreſſions as to preſerve the vigour of the living principle. Dotage and diſeaſe ſucceed, and are accompanied with every mark of a decreaſing ſenſibility of the nerves, and a failure of the ſtrength of the living principle, until its powers are, at laſt, totally extinguiſhed. This is, in ſome degree, ſimilar to what is obſerved when a ſlight, but general, diſpoſition to palſy takes place in the ſyſtem, which gradually increaſes until it ends in the extinction of the powers of life.

Having thus taken a ſhort view of the effects produced by the nerves loſing their accuſtomed ſenſibility to ſtimuli, which prevents

prevents a proper degree of action on the living principle, and produces a proportionable declenſion of its powers, we ſhall proceed to examine the effects of healthful ſtimuli applied to the ſyſtem.

20. In entering upon this ſubject, it is neceſſary to remark a very ſingular circumſtance, that the gaſtric fluid, which moſt likely undergoes ſome conſiderable change after it is ſecreted by the glands of the ſtomach, for the purpoſe of digeſtion, is capable of readily diſſolving dead fleſh, but exerts not the leaſt ſolvent power on fleſh ſo long as it is endowed with life, for worms are bred and nouriſhed in the ſtomach and bowels; nor has it the ſmalleſt effect in this way on the coats of the ſtomach in the living animal, but the worms are no ſooner dead than their diſſolution commences; and that excellent anatomiſt Mr John Hunter, has clearly demonſtrated by diſſections, that the coats of the ſtomach itſelf are not exempted, after the complete death

death of the animal, from the diſſolvent powers of this gaſtric menſtruum. This menſtruum appears to be of various ſtrengths, in different people. For although Mr Hunter, and others, have unqueſtionably ſhown that the coats of the ſtomach are diſſolved, after death, by the gaſtric juice, yet this remarkable phaenomenon by no means conſtantly happens, or, at leaſt, ſo early after death as has been ſometimes obſerved. There is even reaſon to believe, that, in healthy people, who have a quick digeſtion, the ſolvent powers of this ſingular fluid are much greater than in valitudinary habits. Such people, from the unuſual weakneſs of this menſtruum, are neither ſo often nor ſo ſtrongly affected with the ſenſation of hunger; or, in other words, while the morbid ſecretion of the gaſtric fluids continues, they complain of want of appetite and of indigeſtion on the ſmalleſt exceſs of diet.

21. Though hunger probably proceeds from the action of the gaſtric juices on the nerves of the ſtomach, it muſt be conſidered as a healthful ſtimulus. It is our monitor, and ſometimes a ſevere one, to take aliment, which is ſo neceſſary for our ſubſiſtence. Nothing, however, exhauſts the ſpirits, or debilitates the body more than a long continued action of this ſtimulus, eſpecially when accompanied with fatiguing exerciſe of the body.

22. A due proportion of aliment removes the diſagreeable ſenſation of hunger, and that faintneſs and languor with which it is always accompanied. Proper food likewiſe gives a ſtimulus of an oppoſite kind to the nerves of the ſtomach, by which they acquire additional ſtrength and firmneſs; and, as the whole ſyſtem ſympathiſes with the ſtomach, the ſame effects are extended to every part of the body, and enable us to renew our labours with freſh vigour. This ſtimulus continues while the food remains

in

in the ſtomach, but, ſoon after the ſtomach becomes empty, the ſame appetite returns. The time of digeſtion is various, according to the ſtrength of the digeſtive powers, and the quantity and quality of the food. During the time of digeſtion in the ſtomach, and even while the aliment is undergoing a farther change in the bowels, the above ſtimulus aſſiſts in maintaining the powers of action, which are ſo apt to decline on ſuffering hunger for any length of time.

23. In health, when the body has been refreſhed by a proper quantity of aliment and reſt, there is a certain accumulation of the powers of action in the brain and its appendages, which anſwers the exigences of the ſyſtem. The perſon having thus received an additional vigour, which, from the continued exerciſe of the body or mind, gradually decreaſes, he, at laſt, becomes languid, and leſs fit for the performance of theſe exerciſes; a general debility and wearineſs prevails over the body, which

increaſe

increaſe and are ſucceeded by that ſuſpenſion of the animal actions we call ſleep. When ſleep is continued for a certain time, the powers of action recover their former ſtrength, and the perſon awakes with the ſame capability of exerciſe and ſtudy, as at the commencement of the former day.

24. When theſe exerciſes are carried on with moderation, the powers of action are ſtrengthened. Every one knows that additional ſtrength is given to the body and mind by due exerciſe, that debility is induced by a ſedentary life, and that by inactivity the mind becomes languid and loſes its vigour. But, if theſe exerciſes, particularly thoſe of the body, are carried on beyond what the powers of action in the ſyſtem can bear with eaſe, the body becomes weak and languid, the powers of action are greatly impaired, and, as ſometimes happens, are totally exhauſted, and death enſues. But diſeaſe is the more common conſequence of

thoſe

thoſe violent exerciſes when frequently repeated.

25. From the two preceding paragraphs, it appears, that the powers of the living principle, which are preſerved and improved by moderate exerciſe, are diminiſhed, and even exhauſted, by too violent exertions. But, if exerciſe is not ſo intenſe as to lay the foundation of diſeaſe, or to extinguiſh the powers of life, they may be again recovered by reſt and diet. Hence it is evident, that the powers of the living principle may be employed with eaſe, and with pleaſure, while they are conſiderable in quantity. Then our actions are free, quick, and alert. But, as ſoon as this accumulation of the powers of action is diminiſhed in the brain and its appendages, they are conducted by the nerves with leſs freedom. A languor of courſe takes place, and it is accompanied with that diſagreeable ſenſation, known by the name of wearineſs or fatigue. This languor is removed by

reſt, or a ſuſpenſion of the animal actions in ſleep. During ſleep, the vital motions are carried on with vigour, as if they were labouring to reſtore the diminiſhed powers of the living principle.

26. The readineſs with which the powers of action are conducted, by particular nerves, is greatly aſſiſted by habit. The gait and motions of an infant beginning to walk, are aukward and infirm; not ſo much from a deficiency of the powers of action, as from a want of that practice, in the uſe of particular muſcles, which he gradually acquires, and which gives ſtability to his motions. In the firſt leſſons of a perſon learning to dance, every ſtep and movement of his body is ſo aukward and ſlow, that it is impoſſible for him to connect the ſteps of the dance with the time of the muſic. By degrees, the learner acquires a greater facility in his movements, ſoon dances gracefully, and, at laſt, acquires that dexterity in the uſe of thoſe muſcles employed

ployed in the performance of the ſeveral ſteps which compoſe the dance, that the muſicians have only to play a tune, the time of which correſponds with any of the dances the ſcholar has been taught, to put him in motion like a machine. This motion, it is true, may be ſtopped by the intervention of the mind, otherwiſe it proceeds till the dance is ended, or the muſic ceaſes. What a diſagreeable noiſe does every perſon make when he begins to learn the practice of muſic? How ſlow, and how wretchedly out of time, are his firſt leſſons played? The reaſon is obvious. The mind muſt be employed in recollecting the preciſe manner in which every note is performed. But, in proceſs of time, after a long and diligent practice, the motion of the fingers in performing the notes appears to be ſynchronous with the idea he has of the ſeveral ſounds to be made in the compoſition of the tune, which he runs over in his mind, whilſt the fingers are employed in playing it with the utmoſt exactneſs, both as to time

time and tone, moving, in many pieces of muſic, ſo nimbly, and with ſuch accuracy and eaſe, as if they thought for themſelves. The art of balancing, the dexterity of workmen in certain mechanical employments, &c. all admit of a ſimilar explanation.

27. It may not be improper to take ſome further notice of the effects of habitual and daily exerciſes of the body. Exerciſe increaſes the ſtrength, by conferring on the muſcular fibres greater powers of action than is enjoyed by thoſe who lead a ſedentary life. Conſiderable additions of ſtrength, with a robuſtneſs of conſtitution, acquired by hard labour, are, perhaps, always attended with a diminution of mental capacity; becauſe the daily expence of the powers of action is chiefly employed in muſcular motion; by which means the energy of the brain is ſo diminiſhed, that it is incapable of exerciſing the mental faculties. But the principal reaſon is, that the mind is unaccuſtomed to exerciſe itſelf in the

the ſerious contemplation of other ſubjects than thoſe of labour, ſubſiſtence, and reſt; and, from this inactivity of the mind, and the conſequent want of ideas to aſſiſt their judgment, the capacity of ſuch people muſt, to the end of life, be extremely limited.

28. The original difference of capacities is often remarkably great. But the improvement of them in infancy, youth, and manhood, depends on the degree of exerciſe given to the mental faculties during theſe periods. The boy who has always maintained the place of Captain or Dux in the ſeveral claſſes of Engliſh, Latin, and Greek, from a real ſuperiority of capacity, when ſent from ſchool to a mechanical employment, will, probably, from his natural advantages, ſupport, through life, the character of an intelligent ſenſible man, as well as that of an ingenious artiſt. But his mind not being inſtructed to that degree it was capable of, the farther improvement

of

of it will go on ſlowly, whilſt others, inferior to him in parts, by being bred to ſome learned profeſſion, and from a daily application of their minds to ſtudy, not only obtain, in a few years, a tolerable knowledge of their profeſſion, but of philoſophy, arts, ſciences, hiſtory, &c. Even in ſuch ſtudies as they may have hitherto been totally unacquainted with, they will receive their information with greater eaſe than their ſchool-fellow, whoſe capacity was ſuperior, but not equally cultivated. But men, proſecuting their ſtudies, and improving their minds on ſo extenſive a plan, are neceſſarily led into a ſedentary life. During the active time of youth, the effects of this mode of living are not ſo conſpicuous as in the more ſedate period of manhood, when the love of ſtudy and of eaſe increaſes, and gradually brings on that debility of body, which lays the foundation of chronic diſeaſes.

29. Although the principle of life, with regard to quantity and power, varies in different perſons, yet, we find, from experience, that, in ſome, a moderate ſhare of it maintains health equally well, and for as long a period as others who poſſeſs it in a more eminent degree. For it frequently happens with theſe laſt, from the keenneſs of their paſſions, and the greater activity of their mind, exerted on other objects, that they are ſubjected to more expence of the powers of action; and, of courſe, the marks of old age advance as faſt in them as in thoſe who never poſſeſſed ſo large a ſhare of the powers of life, but whoſe diſpoſitions and paſſions were of a milder nature, accompanied with more chearfulneſs and ſerenity of mind, and whoſe bodily exerciſes conduced to the preſervation of health.

30. The paſſions of the mind, when raiſed high, or continued for a conſiderable time, debilitate the ſyſtem and diminiſh the powers

powers of life. Excefs of joy or of fear has fometimes occafioned inftant death; not from an immediate extinction of the living principle, which remains in the body for a certain time after a fufpenfion of all action, but from the excefs of excitement of it in the brain, which, in fome irritable habits, totally extinguifhes the animal and vital motions *.

31.

* The fatal effects of fear, when carried to excefs, on fome delicate females, are fo generally known, as to render it almoft unneceffary to cite authorities in confirmation of that fact. It may, therefore, be fufficient to mention fome inftances of the dreadful effects of this affection, from the moft unqueftionable evidence of feveral gentlemen who lived in Holland for many years, and were prefent at the arrival of the alarming news of the taking of Bergen-op-zoom, in the year 1747. Such was the general conftternation, that many women were known to die of fright foon after this intelligence was communicated to them. This is no uncommon incident in that country, where the women, efpecially thofe of the lower claffs, are fo much enervated by moifture, low diet, and drinking immenfe quantities

31. When a high ſpirited benevolent man loſes his beloved friend, or is, with his family, by unexpected accidents, reduced from eaſy circumſtances to poverty, or apprehends that his honour is injured, and, in conſequence of ſuch misfortunes, a ſettled grief takes poſſeſſion of his mind, it ſeldom fails to reduce the ſtrength of his ſyſtem, the powers of life being gradually waſted in melancholy contemplations. In

 this

tities of ſtrong tea, on the abrupt intimation of melancholy news, which is vulgarly called dying of the *ſcreak*, perhaps, from the ſudden ſcream they uſually give immediately on being ſo diſagreeably ſurpriſed. However, ſudden death, from an exceſs of joy, though equally certain, is more uncommon. There are, however, many proofs of it on record. But I ſhall only mention what Livy relates concerning the effects of ſudden and exceſſive joy on two women, upon ſeeing their ſons return unhurt after the famous battle of Thracymen: 'Unam in ipſa porta, ſoſpiti filio repente oblatam, in 'conſpectu ejus expiraſſe ferunt; alteram, cui mors filii 'falſo nunciata erat, moeſtam ſedentem domi, ad pri-'mum conſpectum redeuntis filii, gaudio nimio exani-'matam;' *Lib.* xxii. *cap.* 7.

this diſordered ſtate of the mind, the ſeveral functions of the body are performed with languor and fatigue; diſeaſe ſucceeds, which it is not in the power of the phyſician to remedy, unleſs the morbid affection of the mind can be removed or obliterated; for, if the mental affection cannot be cured, the diſordered ſtate of the body increaſes with the diminiſhed powers of life, until death relieves the unhappy ſufferer from miſery.

32. When old men are unfortunately addicted to venereal pleaſures, they conſult their paſſions rather than their abilities. It may be ſaid of them what Virgil mentions of the bees when they ſting, *animaſque in vulnera ponunt*. It is true, they ſeldom die in action; yet, from the repeated ſhocks given to their ſyſtem, palſies, and ſimilar diſorders, which indicate a conſiderable diminution of the powers of the living principle, are frequently the conſequence.

33.

33. The effects of the other paſſions, when intemperately exerciſed, are ſimilar to thoſe already mentioned; for, it is evident from parag. 29. 30. 31. and 32. that a certain degree of ſtrength muſt be maintained in the ſyſtem for the right performance of the functions. This admits of ſome latitude, and varies in different perſons, according to their conſtitution and manner of life, (Vid. parag. 29.) Hence, when the powers of action are conſiderably diminiſhed by a long and frequent exerciſe of intenſe paſſion, there remains not a ſufficiency of them for performing the functions with that degree of vigour which is neceſſary to health. Beſides, during the continuance of any violent paſſion, there is ſuch an unequal diſtribution of the powers of action, as produces the moſt conſiderable changes in the ſyſtem.

34. The powers of the living principle are conveyed in an uninterrupted manner to every part of the body. This is the cauſe

cauſe of that uniform continuance of life, ſenſation, and aptitude for motion in all its parts. The whole muſcular fibres are repiete with this principle, and are ſo tenacious of it, that it remains for ſome time after the death of the animal, or their ſeparation from the body. This time varies according to the nature of the animal. Man, and ſuch quadrupeds as have their reſpiratory organs ſimilar to thoſe of the human ſpecies, their circulation quick, their blood warm, and their brain large in proportion to the ſize of the ſpinal marrow, retain it only for a ſhort ſpace after the vital motions have ceaſed. But animals of the amphibious kind, whoſe lungs, from a particular conſtruction, admit of reſpiration being ſtopped for a conſiderable time, whoſe circulation is ſlower, whoſe blood is colder, and whoſe ſpinal marrow is large in proportion to the ſize of their brain, retain the principle of life in their muſcular ſubſtance for a conſiderable time after decollation; and, even when the animal has been cut in

pieces,

pieces, every ſeparate part ſhowing evident ſigns of life and irritability, which can only be derived from the partial preſence of the living principle. Every perſon converſant in experiments of this kind knows, that the muſcles, and particularly the heart, of frogs, vipers, eels, turtles, and other amphibia, when ſtimulated with a ſharp inſtrument, or an acrid ſubſtance, contract and palpitate for ſome time after they have been ſeparated from their bodies.

What is here mentioned explains the general deception of thoſe who believe the tendinous ſubſtance under the tongue of every dog to be a worm, becauſe of a very ſmall, though perceptible, motion it has immediately after it is cut out. This fooliſh practice is improperly called *worming*, for nothing unnatural is taken from the animal.

35. Some years ago, I cut out the heart and part of the large veſſels of a turtle, with a view to examine the ſtructure of theſe

theſe parts, and the circulation of the blood in that animal. Having wiped off the blood and other moiſture, the heart was wrapped up in a handkerchief; but engagements in the way of my profeſſion obliged me to poſtpone my curioſity till about ſix or ſeven hours after it was cut out. When I examined it, there appeared not the leaſt ſigns of life. It was much ſhrivelled and dried. But, by putting it into water, nearly milk warm, it plumped up, and ſome of its parts acquired a tremulous motion. Laying it on the table, and pricking it with a large needle, it palpitated ſeveral times. The palpitation renewed as often as the needle was puſhed into its ſubſtance, until it became cold, when it ſeemed to be inſenſible to every ſtimulus. But, after warming it again in the water, it recovered its irritability, and repeated its palpitations on the application of the needle. Though no movement could be excited in it by any ſtimulus when cold, yet it moved ſeveral times after being macerated in warm water.

water. This evidently ſhows the neceſſity of heat and moiſture for maintaining the full powers of the living principle.

36. Previous to death, in certain fevers and chronic diſeaſes, the principle of life is gradually exhauſted in every part. Coldneſs of the extremities, and a defect of circulation in them, ſucceed a general debility of the body. Reſpiration and the motion of the heart are accelerated; but they decline by degrees in ſtrength and regularity. Soon after, theſe motions become ſlower and irregular, and, at laſt, totally ceaſe. It not unfrequently happens, during the laſt efforts of nature for the continuance of life, that ſlight convulſive motions of the muſcles, particularly of the eyes and face, precede death. This effect probably ariſes from their vicinity to the principal ſeat of the living powers. But the more remote muſcles are not affected; for, from the want of a ſufficiency of life, they are incapable of being acted upon.

In

In ſuch caſes, after death, the muſcles are found to be in a relaxed ſtate, being ſoft and flexible. But, in thoſe who die ſudden and violent deaths, from wounds of the brain, ſpinal marrow, or from large evacuations of blood, all the muſcular fibres having that quantity of the principle of life natural to a healthy ſtate, they, of courſe, contract, and the muſcles, for ſome time after death, are more tenſe and firm, to which the fulneſs of the ſmall veſſels and cellular ſubſtance may alſo contribute.

37. To theſe facts and obſervations on the nature and properties of the living principle in animals, many more might be added, were I not afraid of having been already too tedious on a ſubject, the intricacy of which prevents me from proſecuting it with ſatisfaction to myſelf. But, as bad ſolutions, when their faults are detected, ſometimes give riſe to others more ſatisfactory, I hope, that what I have advanced

vanced may ſtimulate the induſtry of ſome more ingenious and fortunate inquirer into the laws of the animal oeconomy, and the powers and operations of the living principle.

38. Every thing that relates to the nerves being cloſely connected with the operations of the living principle, I ſhall, in the following ſection offer ſome obſervations on them, and on the nature of ſympathy. On which ſubject, the learned and ingenious Count de Buffon has expreſſed himſelf as follows: 'La correſpondance qu'ont cer-'taines parties du corps humain avec d'au-'tres fort éloignées et fort différentes, et 'qui eſt ici ſi marquée, pourroit s'obſerver 'bien plus généralement; mais on ne fait 'pas aſſez d'attention aux effets lorſqu'on 'ne ſoupçonne pas quelles en peuvent être 'les cauſes: c'eſt ſans doute par cette raiſon 'qu'on n'a jamais ſongé à examiner avec 'ſoin ces correſpondances dans le corps hu-'main, ſur leſquelles cependant roule une

'grande partie du jeu de la machine ani-
'male : Il y a dans les femmes une grande
'correſpondance entre la matrice, les ma-
'melles, et la tête ; combien n'en trouve-
'roit-on pas d'autres, ſi les grands Méde-
'cins tournoient leurs vues de ce côté-là ?
'il me paroit que cela ſeroit peut-être plus
'utile que la nomenclature de l'anatomie.
'Ne doit-on pas être bien perſuadé que
'nous ne connoîtrons jamais les premiers
'principes de nos mouvemens ? Les vrais
'reſſorts de notre organiſation ne ſont pas
'ces muſcles, ces veines, ces artères, ces
'nerfs, que l'on décrit avec tant d'exacti-
'tude et de ſoin ; il réſide, comme nous
'l'avons dit, des forces intérieures dans les
'corps organiſés, qui ne ſuivent point du
'tout les loix de le mécanique groſſiére que
'nous avons imaginée, et à laquelle nous
'voudrions tout réduire : Au lieu de cher-
'cher à connoître ces forces par leurs ef-
'fets, on a tâché d'en écarter juſqu' à
'l'idée, on a voulu les bannir de la Philo-
'ſophie ; elles ont reparu cependant et avec

'plus

‘ plus d'éclat que jamais dans la gravita-
‘ tion, dans les affinités chimiques, dans les
‘ phenomenes de l'électricité, &c. Mais
‘ malgré leur évidence et leur univerſalité,
‘ comme elles agiſſent à l'intérieur, comme
‘ nous ne pouvons les atteindre que par le
‘ raiſonnement, comme en un mot elles
‘ échappent à nos yeux, nous avons peine
‘ à les admettre ; nous voulons toujours
‘ juger par l'extérieur ; nous nous imagi-
‘ nons que cet extérieur eſt tout ; il ſemble
‘ qu'il ne nous ſoit pas permis de pénétrer
‘ au-delà, et nous négligeons tout ce qui
‘ pourroit nous y conduire.

‘ Les Anciens, dont le génie étoit moins
‘ limité et la philoſophie plus étendue, s'é-
‘ tonnoient moins que nous des faits qu'ils
‘ ne pouvoient expliquer, ils voyoient
‘ mieux la Nature telle qu'elle eſt, une ſym-
‘ pathie, une correſpondance ſingulière
‘ n'étoit pour eux qu'un phénomène, et
‘ c'eſt pour nous un paradox dès que nous
‘ ne pouvons le rapporter à nos prétendues
‘ loix du mouvement ; ils ſavoient que la

‘ Nature

'Nature opère par des moyens inconnus la 'plus grande partie de ſes effets, ils étoient 'bien perſuadés que nous ne pouvons pas 'faire l'énumération de ces moyens et de 'ces reſſources de la Nature, qu'il eſt par 'conſéquent impoſſible à l'eſprit humain 'de vouloir la limiter en la réduiſant à un 'certain nombre de principes d'actions et 'de moyens d'opérations; il leur ſuffiſoit 'au contraire d'avoir remarqué un certain 'nombre d'effets relatifs et du même ordre, 'pour conſtituer une cauſe.

'Qu'avec les Anciens on appelle ſym-'pathie cette correſpondance ſingulière des 'différentes parties du corps, ou qu'avec 'les Modernes on la conſidère comme un 'rapport inconnu dans l'action des nerfs, 'cette ſympathie ou ce rapport exiſte dans 'toute l'économie animale, et l'on ne ſau-'roit trop s'appliquer à en obſerver les ef-'fets, ſi l'on veut perfectionner la théorie 'de la Médecine; mais ce n'eſt pas ici le 'lieu de m'étendre ſur ce ſujet important *.'

SECTION

* Tom. ii. pag. 485.

SECTION II.

OF THE NERVES, OF SYMPATHY, AND OF STIMULI.

39. FROM the foregoing ſection it appears, that the nerves, being ſo many elongations of the medullary ſubſtance of the brain, are conductors of part of the living principle to all the organs of the body, for the purpoſes of life, ſenſation, and action; that it is by means of the nerves the living principle is acted upon; that they are alſo the medium through which all ſenſations are communicated to the ſenſorium, and in ſo rapid a manner, that they ſeem ſimultaneous with the impreſſions made on the nerves, or rather, they convey an idea as if the ſenſorium were extended to every ſenſible part of the body. At the ſame time, we are but little acquainted with the circumſtances on which this

this conducting power of the nerves depend. We know when a nerve is cut through, or compreſſed by a ligature, tumour, or otherwiſe, that the parts below the place where the injury is received, loſe their ſenſibility and aptitude for motion, either altogether, or in proportion to the dependence they had on ſuch nerve for that portion of the principle of life conveyed by it, for the maintenance of their ſeveral functions, as if the powers of the animal were incapable of puſhing this vital fluid acroſs the ſmalleſt interval of ſpace. This is a moſt intricate ſubject; for, as I have juſt now mentioned, we are ignorant of the conditions which the nerves poſſeſs or loſe in their healthy or unhealthy ſtate, by which they are fitted, or rendered unfit, for their offices in the oeconomy. We know them to be variouſly affected by different ſtimuli; but in what manner ſtimuli operate on the nerves, ſo as to alter thoſe conditions which preſerve the ſtrength or produce a debility in the nerves, remains ſtill

a ſecret in phyſiology. The little information we can receive concerning this intereſting part of the animal oeconomy, muſt be chiefly drawn from an accurate attention to the real nature of the ſtimuli themſelves; or rather to their effects on the ſyſtem, and as to their particular mode of operating, we may deſpair of ever coming to any diſtinct notion of it, nor would ſuch knowledge be of much conſequence to us. For, although it is of real uſe to know that wine, camphire, and volatile alkaline ſpirits, act as cordials, opium as a ſedative, and that mercury will raiſe a ſalivation; yet the knowledge of the preciſe manner in which they produce their effects on the body is a matter of ſpeculation which muſt always be involved in doubt. Nor does our ignorance in that particular preclude us from the uſe of cordials, opiates, or mercurials, in ſuch diſorders of the body as experience has ſhown them to be uſeful.

40. From that intimate connection of the ſeveral parts of the brain and cerebellum, obſerved in parag. 4. and of the nerves with each other, after they leave the ſkull and vertebrae, by means of the ganglia and plexus, from which there is ſuch an extenſive interchange of nervous filaments, that no nerve, at its termination, can be ſaid to conſiſt of the identical fibres which compoſed it at its origin, but of thoſe of many other nerves, interwoven with ſome of its original filaments, the reſt being expended in the above interchange of ſmall branches with other nerves as it paſſes along to that part of the body where its functions are to be exerciſed; and, from that unity of ſubſtance in the nerves with the brain, (parag. 7.) probably ariſes that general ſympathy known to exiſt between all parts of the body, or of the whole ſyſtem with a diſeaſed part, occaſioning conſiderable changes in the functions during the continuance of acute and chronic diſorders, independent of ſimilar effects from the cauſe of the diſeaſe

diſeaſe acting on the ſyſtem. Hence it appears, that no part of the body can be morbidly affected for any conſiderable time, without the reſt of the ſyſtem ſuffering in ſome degree.

41. In bodies naturally ſtrong and in health, the nerves are capable of bearing certain ſtimuli for ſome time, without injury to the reſt of the ſyſtem, which, in perſons more delicate, or who have become ſo from diſeaſe, would produce pain, or other diſagreeable effects. Nay, it ſeldom or ever happens, that all the parts of the ſyſtem are equally capable of reſiſting the effects of ſtimuli. Hence, certain parts, ſometimes at a conſiderable diſtance from the application of the ſtimulus, ſuffer in a remarkable manner, while the reſt ſeem to be no otherwiſe affected than as uſually happens from general ſympathy, (parag. 40.) And the late ingenious Dr Whyte, on this ſubject, makes the following practical obſervations: 'I think it moſt pro-

'bable, that the anomalous ſympathies a-
'bove mentioned, and many others, whoſe
'cauſe appears equally obſcure, proceed
'from that general ſympathy which pre-
'vails through the whole nervous ſyſtem;
'and which, in certain caſes, in conſe-
'quence of the uncommon weakneſs or de-
'licacy of a particular organ, makes it ſuf-
'fer, although the other parts of the body
'are not ſenſibly affected. The following
'caſes, compared together, will ſerve to il-
'luſtrate this.

'A middle aged woman, who had ſtrain-
'ed her right foot and ancle, ſome weeks
'after, not only complained of a pain, and
'ſtiffneſs in theſe parts, but alſo felt, though
'in a much leſs degree, a tenſion and ſore-
'neſs over her whole body. On the other
'hand, a girl of nine years of age, as of-
'ten as one of her feet was extended, ſo as
'to bring it nearly to a right line with the
'leg, and conſequently greatly to ſtretch its
'ligaments and tendons, was inſtantly ſei-
'zed with a moſt violent convulſive cough,

'which

'which continued, without intermiſſion, as 'long as the foot was kept in that poſition. 'In the former caſe, it will readily be al- 'lowed, that the ſtiffneſs and ſoreneſs felt 'through the whole body proceeded from 'that general ſympathy which obtains be- 'tween all its parts by the mediation of the 'brain, which, however would not have 'produced ſuch an effect, but for the pe- 'culiar delicacy of the nervous ſyſtem in 'that patient.

'In the latter caſe, the convulſive cough 'occaſioned by extending the foot, could 'not proceed from any particular ſympa- 'thy between this part and the lungs, in 'conſequence of any connection or com- 'munication between their nerves, ſince 'the nerves of many other parts have an 'equal, or greater connection with thoſe 'which ſerve the feet. This convulſive 'cough, therefore, muſt be aſcribed to a 'peculiar delicacy, or uncommon ſenſibi- 'lity of the lungs; whence, in conſequence 'of that general ſympathy which prevails

'through

'through the whole nervous ſyſtem, they 'were affected with a diſagreeable ſenſation 'as often as the ligaments and tendons of 'the ancle and foot were overſtretched; 'which, however, produced no uneaſineſs 'or ſympathetic motion in the other parts 'of the body, becauſe they were endued 'with no morbid delicacy or uncommon 'ſenſibility.

'As a further proof of this, I knew a 'woman who had ſo delicate a ſtomach, 'that, when this organ was more than u-'ſually indiſpoſed, was apt to fall a reach-'ing as often as ſhe made the neceſſary ef-'forts to paſs water; and I have had ſeve-'ral perſons affected, in conſequence of a 'virulent gonorrhoea, with a gleet, and a 'tenderneſs, and ſome degree of foreneſs in 'the urethra, who, as often as they drank 'two or three glaſſes of wine, immediately 'felt an uncommon uneaſineſs in that part. 'This extraordinary ſympathy, however, 'between the ſtomach and urethra, ceaſed 'as ſoon as the latter became quite ſound.'

'Since

'Since we obſerve that only thoſe whoſe 'nervous ſyſtem is remarkably delicate, are 'affected with general and violent convul- 'ſive motions or ſpaſms from the paſſions 'of the mind, diſorders in the *primae viae*, 'and other cauſes; have we not reaſon to 'conclude, when, in conſequence of an ir- 'ritation of any one part, an uncommon 'ſympathetic motion is produced in a di- 'ſtant organ with which it has leſs connec- 'tion, either by the nerves or blood-veſ- 'ſels, than with many other parts which 'are nowiſe diſturbed; that ſuch ſympa- 'thetic motion is owing to a peculiar deli- 'cacy or mobility of that organ; and that, 'were the other moving organs of the body 'equally delicate and ſenſible, univerſal, or, 'at leaſt, more general convulſions, or 'ſpaſms, would have been the conſe- 'quence*?' From this morbid irritability in certain parts, it appears, that a variety of uncommon ſympathies muſt take place in

* On nervous diſeaſes, Edinburgh 1765, pag. 79.

in thoſe perſons in whom ſuch preternatural irritability exiſts, notwithſtanding ſome phyſiologiſts have endeavoured to account for them, and other anomalous ſympathies, from the connection of the intercoſtals with the 5th, 6th, and 8th pairs, and with almoſt all the nerves which proceed from the ſpinal marrow. But their theories, however ingenious, were ill founded, not being ſufficiently ſupported either by facts or experience. Not that I would abſolutely deny that ſympathies ariſe from the connection of nerves; for, in this way, they may ſometimes happen, but not ſo often as is commonly alledged.

42. In a few inſtances they ſeem to be owing to certain laws eſtabliſhed in the ſyſtem, by which diſtant parts are brought to conſent with the ſeat of the diſeaſe or part where the ſtimulus is applied, as if nature, on ſuch occaſions, called for aſſiſtance to relieve her from ſomething hurtful to the body; as ſickneſs and vomiting ariſe

from

from the irritation of a ſtone in the ductus communis, cholidochus, kidney, ureter, or bladder. A ſimilarity of texture and conſtitution of nerves at their termination is often the cauſe of particular ſympathies, as an eye, kidney, teſticle, or mamma *, with thoſe

* When a woman is ſuckling her child, if both breaſts happen to be full, ſhe applies the infant to one; that inſtant the child commences ſucking, the milk of the other breaſt runs out, which obliges her, after a ſhort period, to move the child from one breaſt to the other, until both are ſomewhat emptied, when that oſcillatory motion of the tubuli lactiferi raiſed by the action of ſucking, and communicated to the oppoſite breaſt by ſympathy, from a ſimilarity of texture and conſtitution of the nerves in both breaſts at their termination, ceaſes to have ſufficient force to propel the milk to the nipple. For a ſimilar reaſon, if a woman nurſing her child ſhall, from any accident, be unfortunately ſeized with an inflammation and ſuppuration in one of her breaſts, after the matter has been let out, the diſcharge from the ſore gradually leſſens for ten or twelve days, when it is ſucceeded by another inflammation and ſuppuration, which, running through the ſame courſe as the former, a third takes place, and ſo on,

thoſe of the oppoſite ſide. Sympathies frequently ariſe from vicinity of parts, as a teneſmus during the continuance of a ſevere ſtrangury, which laſt complaint is ſometimes brought on from acrid humours irritating the ſphincter ani. But the greateſt number of anomalous complaints of the ſpaſmodic kind, in parts diſtant from the original ſeat of the diſeaſe, is inexplicable by any thing I have ſaid or can ſay on this ſubject; for as to the cauſe why a blow on the head ſhould occaſion a vomiting of bile; violent vomiting and purging, cramps in the thighs and legs; the dry belly ach, a palſy of the lower extremities; a wound in the foot or hand, a locked jaw; I know not;

on, the poor woman continues, for the moſt part, to be tormented with one ſuppuration after another until the child is weaned, or ſhe gives over nurſing. Becauſe every time the child is put to the ſound breaſt an increaſed oſcillatory motion is brought on the whole of the veſſels of the other, which being in a preternatural degree irritable, keeps up that tendency to inflammation which I have ſo frequently obſerved in practice.

not; and muſt alſo confeſs my ignorance of the cauſe of many other dangerous ſympathetic affections in the courſe of diſeaſes, on the ſuppoſition of a connection of nerves. But, notwithſtanding theſe limits to our inquiries into the cauſes, we ought not to neglect the facts themſelves, an acquaintance with which is ſo neceſſary for acquiring a knowledge of the nature of many ſymptoms, and even of the diſeaſes from which they are derived. Not that I conſider it as neceſſary to enumerate the great variety of ſympathies occurring in the courſe of diſorders, ſince they are, in general, known to practitioners. I cannot, however, omit taking notice of a few of the moſt remarkable, and which merit our particular attention.

43. In the *firſt* place, I ſhall mention that widely extended ſympathy which is ſo often obſerved between the ſtomach and every other part of the body. *Secondly*, The ſympathy of the ſtomach and bowels with

the head, *et vice verſa*. *Thirdly*, The ſympathy of the ſtomach with the kidneys, uterus, &c. *Fourthly*, That particular ſympathy of the vital motions of the lungs and heart with the ſtomach and bowels. *Fifthly*, The ſympathy of the uterus with the mammae. And, *ſixthly*, The ſympathy of the heart with the lungs in a moſt eminent degree, (parag. 13.) From all which it appears, that the ſtomach is the principal ſeat of many of the moſt remarkable ſympathetic affections which happen in valitudinary ſtates of the body. Every diſorder accompanied with ſevere pain affects the ſtomach, whilſt this viſcus affects, not only in its diſeaſed ſtate, every part of the ſyſtem, but at other times the effects of healthful ſtimuli applied to it are inſtantly communicated to the reſt of the body, as when we take food, wine, and medicine. There are other ſympathies beſide thoſe mentioned, as that of the internal membrane of the bronchi with the ſkin, on the application of cold to the ſurface of the body in the production

duction of a catarrh, and that of the ſkin with the ſtomach and bowels, *et vice verſa*, at the commencement and during the continuance of fevers, which ſhall be more particularly taken notice of when we come to treat of theſe diſorders.

44. Such ſtimuli as by their action ſupport the living principle, (parag. 16. 17. and 22.), or by preſerving or reſtoring certain conditions to the nerves, and which are neceſſary to the maintenance of their powers as conductors, may be called healthy, becauſe they give ſtrength and vigour to the whole ſyſtem.

45. Other ſtimuli, by acting in ſuch a manner on the nerves as to alter them from a natural to a morbid ſtate, or by ſo diminiſhing or deſtroying their power of conducting, as to prevent wholly, or in part, the uſual action on the living principle, (parag. 16. and 17.) muſt be deemed unhealthy, becauſe they leſſen the active pow-

ers

ers of the body. Of this kind are not only thoſe which are in ſome degree noxious to the human ſyſtem, but even ſalutary ſtimuli, when they are too freely applied. This is the caſe with all of our beſt and moſt active remedies and applications; and no illuſtration is neceſſary to ſhow that any perſon may be over doſed, or that a variety of ſalutary or noxious effects may ariſe from the uſe of aromatics, Jeſuits bark, camphire, opium, wine, &c. given in moderate or in immoderate quantities.

46. Although, from habit, certain ſtimuli can be borne by particular people with impunity, or little injury, yet, in general, their effects being always in proportion to their ſtrength and duration, and to the powers of the ſyſtem to which they are applied, (parag. 41.) it muſt ſometimes happen, that particular perſons reſiſt certain ſtimuli, whilſt others are ſenſibly affected by them, the ultimate effects of which are not always obſervable during their applica-

tion,

tion, nor often for ſome conſiderable time after they have been removed. For, allowing the nerves to be morbidly affected by the application of ſtimuli, this muſt produce a correſponding alteration in their mode of action, which is not always rectified on a removal of the ſtimulus; becauſe a diſeaſe being brought on the nerves, a certain ſpace muſt elapſe before they can return to their former healthy ſtate, during which time many of the functions being diſturbed, a proportionable diſorder in the ſyſtem muſt be the conſequence.

47. Such is the nature of certain ſtimuli, that, without ſickneſs, pain, or, ſo far as we can perceive, the ſmalleſt degree of irritation on any part of the body, they are, nevertheleſs, capable, by their continued action, of bringing about the moſt conſiderable changes in the ſyſtem, either with regard to the production of diſeaſes or reſtoration of health. Putrid marſh miaſma, the remote cauſe of certain fevers, is an inſtance of

of the gradual and almoſt imperceptible alteration in ſeveral of the functions, previous to their bringing on the acceſſion of fevers. Peruvian bark is an inſtance of cures being accompliſhed without our perceiving any ſenſible operation from its action on the nerves; at the ſame time, however, it is evident, that it acts on them in a moſt powerful manner, by producing thoſe ſalutary changes on the functions morbidly affected. This circumſtance of unconſciouſneſs ſeems to attend the operation of ſtimuli in general, whether they be of the morbid, ſalutary, or natural kind, when their action is inferior to that which is neceſſary to produce pain or an uneaſy ſenſation. The ſecretions of the liver, pancreas, kidneys, and other glands, may be ſo altered, as to lay the foundation of dangerous diſeaſes, though we are not ſenſible of any affection in thoſe parts previous to the event.

48.

48. The action of medicines, in general, if not given in such quantity as sensibly to disturb the system, is only known to us from their good or bad effects, and not from any irritation, or particular sensation during their operation. This unconsciousness is universal with regard to what may be called unconscious stimuli, the action of which seem to be produced by an affection of the nerves, arising from the application of some active matter, which excites them to motion, or alters their mode of action, so as gradually to produce some change in the system, but without irritation, pain, or consciousness. The organs of sense may be considered as an exception to this general doctrine. But these must be regarded as particularly formed for the reception of impressions peculiar to each. These impressions are extremely different from those stimuli which produce their effects in all involuntary motions without our knowledge. They are the result of a law wisely established by nature for that purpose. The great

great benefit of ſuch a law muſt be apparent, from the neceſſary conſequences of a perpetual irritation on every part of the body, by the action of the natural ſtimuli which excite the alternate contraction and dilatation of the heart and arteries, and conſequently produce the circulation of the blood, the ſecretion of various liquors from it, the abſorption of others to be mixed with the general maſs, and ſimilar operations in the oeconomy. All theſe operations are happily carried on without conſciouſneſs: And though, in a healthy ſtate, they proceed with great regularity, they are ſubject to conſiderable changes from ſtimuli of a different kind, internally or externally applied. Theſe changes appear to be the original cauſes of moſt diſeaſes. The natural ſtimulus of the blood, and of the various liquors ſecreted from it, are almoſt uniformly the ſame on the containing veſſels, whilſt we continue in a healthy ſtate. By its acting on the nervous fibrils of every part, the operations of the oeconomy are

continued without conſciouſneſs, except ſometimes from an over diſtenſion, which muſt be conſidered rather as a mechanical preſſure than as the proper ſtimulus of the fluid.

49. Though the ſenſe of feeling is moſt acute at the points of the fingers, yet the ſkin, in general, poſſeſſes, in a leſs degree, that faculty by which we can decern the nature of particular impreſſions, and hence it is our faithful monitor againſt external injuries. From the number and ſenſibility of the nerves of the ſkin, it is more liable than any other part of the body to be affected by the viciſſitudes of heat and cold, by moiſture, mechanical impreſſions, and by all the variety of acrid matter capable of irritating its nerves or deſtroying its ſubſtance. Of all theſe different ſtimuli, when the nerves are remarkably affected, diſtinct perceptions are communicated to the mind.

50. The nerves of the ſtomach and bowels are ſubjected to a greater variety of imperceptible ſtimuli than thoſe of any other part of the body. Men, whoſe ſenſes, if that of feeling be excepted, are leſs acute than thoſe of moſt of the brute creation, are chiefly directed in the choice of their food by experience, which is, indeed, greatly aſſiſted by ſight, ſmell, and taſte. But the ſtomach itſelf poſſeſſes not the faculty of diſtinguiſhing the qualities of the different articles of food. When the gaſtric juices act on the nerves of an empty ſtomach, the ſenſation of hunger is felt; but the ſtimulating effects of the gaſtric fluids being conſiderably weakened by a mixture of food and drink, and being farther changed by the proceſs of digeſtion, that diſagreeable ſenſation, and all the conſequences of it (parag. 22.) ceaſe. The nature of the other ſtimuli, however, are known rather by their effects on the ſyſtem than by any particular ſenſation excited in the coats of the ſtomach. In languid ſtates of

of the body, the cordial qualities of wine, ardent ſpirits, opium, and a few other ſubſtances, are, by their ſpecific ſtimuli, felt immediately after they are ſwallowed, and their effects are ſo quickly communicated to the reſt of the ſyſtem, that, as ſoon as they are taken, we are ſenſible of a moſt agreeable ſenſation proceeding from the ſtomach and praecordia, over which a warmth of the moſt pleaſant and envigorating kind is diffuſed and communicated to the reſt of the body. But moſt other ſtimuli, unleſs they ariſe to ſuch a degree as to occaſion ſickneſs or pain, are very little felt by the ſtomach, though they have often conſiderable effects on the ſyſtem. This ſingular affection of the nerves of the ſtomach, from the great variety of the articles of diet, and ſometimes of medicine, without any particular perception of the nature of each, appears to be the conſequence of a law eſtabliſhed in the oeconomy, which, like all other laws of nature, carries the ſignature of infinite wiſdom and benevolence. For,

as

as every part of the body ſympathies in ſo remarkable a manner with the ſtomach, (parag. 42.) ſtrong affections of the nerves of that viſcus would neceſſarily diſorder the body at every meal, and, inſtead of aboliſhing the debilitating ſenſation of hunger, we ſhould be ſubjected to various complaints ariſing from ſympathy. However ſenſible we are of the particular taſtes of vinegar, pepper, muſtard, ſalt, and of many other acrid ſubſtances, yet we cannot diſtinguiſh their qualities by any ſenſation on the coats of the ſtomach, except that of an agreeable warmth, when moderately uſed, or of ſickneſs and vomiting, when taken in too large quantities; which is the uſual effect of an exceſs of ſtimulus applied to the internal ſurface of this viſcus, the proper ſeat of ſickneſs: This diſagreeable ſenſation is peculiar to the ſtomach. For, an exceſs of ſtimulus in the inteſtines is only capable of raiſing pain; and if ſickneſs ſhall at any time follow ſevere pain in the bowels, it is always in conſequence of the ſtomach ſuffering,

fering, from ſympathy, with the part firſt affected. The ſtomach, on the other hand, is leſs ſuſceptible of pain than the bowels. In particular caſes, however, it ſuffers moſt ſeverely by ſympathy. This pain in the ſtomach is always of a particular kind. It affects the vital motions more than thoſe of any other part, and, of courſe, oftener produces a deliquium animi.

51. In the ſame manner as the effects of healthful ſtimuli (parag. 44.) are communicated to the reſt of the body, ſo are thoſe of an unhealthy or morbid kind, (parag. 45.) conveyed to the ſyſtem in general, with the ſame unconſciouſneſs of any particular action on the ſtomach, as has been already mentioned, though their effects are often conſiderable. This ſometimes happens when a perſon loſes his colour, his ſpirits, his ſtrength, and, in ſome caſes, his appetite; but, as he ſuffers neither ſickneſs nor pain, he does not ſuſpect his indiſpoſition to proceed from his ſtomach, until the morbid

morbid colluvies is collected in such a quantity as to excite vomiting, which, when properly promoted, and the bowels soon after cleared by a laxative, commonly restores him to health. At other times, certain parts of the body suffer in a particular manner; for many people know that their stomachs are disordered, from the coming on of headachs, or dimness of sight; and, as I have elsewhere observed, fits of the gravel, stone, and gout, and many hypochondrical and hysterical complaints, are not only increased, but sometimes brought on by the same cause. A few radishes, a raw turnip, a glass or two of stale ale, and other things of difficult digestion, or which disagree with the stomach, will give an asthma to many people in a few minutes. And there are numerous cases of this disease in a chronic state, where these unfortunate people, from an extraordinary sensibility of the nerves of the stomach and bowels, cannot even bear the common healthful stimulus from the digestion of their food, without

out being conſiderably diſordered. They frequently have a return of their aſthma about two or three hours after dinner, and ſometimes ſooner. In the inſtance of a gentleman well known to moſt of the phyſicians here, the acceſſion of the fit was remarkably regular at five or ſix o'clock every evening for upwards of twenty-five years. I obſerve in many patients labouring under this diſorder, that, when they eſcape their uſual fit after dinner, they are commonly ſeized with an inſuperable drowſineſs for about an hour; which is not an unuſual effect of digeſtion in particular conſtitutions. But affections of this kind always indicate a preternatural mobility in the nerves of the ſtomach, which may ſometimes be accidentally brought on a perſon not ſubject to it, from a diſordered ſtomach, over fatigue, &c. This ſingular and curious fact in the animal oeconomy, of diſtant parts being ſtrongly affected by ſtimuli applied to the ſtomach and bowels, where, for the moſt part, no particular ſenſation

ſation or commotion is perceived, is a moſt remarkable circumſtance in the conſtitution of their nerves. For ſtimuli applied to other parts, whatever effects they may have on the ſyſtem, are conſtantly felt firſt in the place where they are applied, which is not always the caſe with thoſe acting on the ſtomach and bowels. On the contrary, their moſt evident effects are often in places remote from theſe viſcera, whoſe nerves, at the ſame time, are not only more readily ſubjected to the powers of ſtimuli, but, when affected by them, bring on a greater number of general and particular ſympathies than when applied to any other part of the body. It, indeed, appears as if, from the inſtant that ſtimuli are applied, the whole ſyſtem were engaged in reſiſting their powers; but that ſuch parts as, from a natural or morbid delicacy, or from a ſingularity in the conſtitution of their nerves, are more ready to be affected by particular ſtimuli than others, were the firſt

firſt to yield, and there the moſt conſiderable effects are to be obſerved.

52. In delicate conſtitutions, certain ſtimuli are capable of producing a ſuſpenſion of the animal actions, and, in a great meaſure, of thoſe of the heart and lungs, which are often ſo conſiderably diminiſhed as ſcarcely to be perceived, but are renewed on a removal or abatement of the ſtimulus, provided its action is not continued ſo long as to occaſion a ſuſpenſion of the vital motions, and to reduce the powers of life ſo low as to render them incapable of being again ſtimulated into action. Caſes of fainting, for a longer or ſhorter time, occur in irritable habits from ſlight cauſes, as wind, acrid matter in the primae viae, pain ſuddenly raiſed in any part of the body, ſtoppage of the menſes, difficult menſtruation, ſpaſmodic affections in hypochondriac and hyſteric diſpoſitions, &c. But they are not attended with that danger to life which ſo often accompanies a total or

partial ſuſpenſion of the vital functions from breathing the fumes of burning brimſtone, charcoal, mephitic air, or from a ſtop being put to reſpiration by remaining under water for ſome time. In theſe caſes, there is an evident injury done to the lungs, which greatly increaſes the danger of the extinction of the powers of life. But, in the former, the ſuſpenſion of the animal or debilitated ſtate of the vital motions in fainting, appear to ariſe from ſympathy, and are in general eaſily taken off by a removal or or abatement of the ſtimulus in the part primarily affected. For, during the continuance of the fainting fit, the nerves are, to a conſiderable degree, inſenſible; and no violence having been done to the vital organs, they are readily brought to act in their uſual way, from their natural ſtimuli, the application of cold water to the hands and face, volatile alkali to the noſe, moderate agitation of the body, &c. This ſympathy of the whole ſyſtem with a part of it, cannot poſſibly ariſe from any particular

connection

connection of nerves, but muſt owe its exiſtence to that unity of ſubſtance in the brain and nerves, by which all the parts of the ſyſtem are ſo cloſely connected with each other, (parag. 4. and 40.) that if any part is affected the reſt muſt ſuffer more or leſs. The action of corroborants, aſtringents, antiſpaſmodics, and other remedies, evidently ſhow this. It is true that there are particular parts, as the ſtomach and bowels, which, from a ſingularity of diſpoſition in their nerves, are more capable of producing a general ſympathy.

53. It ſometimes happens in irritable female habits, eſpecially during the firſt three or four months of pregnancy, that the ſmell of a roſe, hiacynth, wall-flower, a few violets, or ſuch other ſubſtances as afford rather a delicate and refreſhing, than a ſtrong odour, ſo affects the nerves of the noſe as to diſorder the whole ſyſtem, in ſo remarkable a manner as to bring on, not only a ſuſpenſion of the animal actions, but alſo

to

to affect the vital motions; which cannot otherwise be produced than by the general sympathy of the system with those nerves *.

54. A blow on the pit of the stomach is often succeeded immediately by a severe fainting, and, frequently, by a suspension of the vital motions, the person remaining for some time apparently dead, or it may occasion the complete death of the body, according to the violence with which the blow has been given. When this last event

* An unmarried Lady, of a healthy constitution, with whom I have been acquainted many years, has such a peculiarity in the constitution of her nerves, that although she can, in general, bear strong odours as well as most people, yet cannot suffer a rose to be in her bosom, or to hold it in her hand a few minutes, without becoming faint, and having an inclination to vomit. Conserve of roses, rose water, and similar articles made from roses, have more powerful effects upon her, and usually excite vomiting. Going into a room where any of her companions are washing with rose-water, never fails to produce this effect; nor does she recover of her indisposition in less than two hours.

vent takes place, it ſeldom happens, on diſſection, that we can diſcover any alteration from the natural and healthy ſtate of this viſcus, as might lead us to conclude it to be a ſufficient cauſe of death. In the firſt caſes of fainting, (parag. 51. and 52.) it moſt probably ariſes from a ſympathy of the ſyſtem with the nerves affected; for, in other inſtances, we know, that ſevere and inſtantaneous pain cauſes a ſuſpenſion of the animal actions for ſome time.

I remember a Lady who fainted from her hand being inadvertently ſqueezed too hard. But ſuch an accident muſt more readily occur from a blow on ſo ſenſible a part as the ſtomach, which, if given with great force, may act ſo ſtrongly on the whole ſyſtem as to ſuſpend all its actions. And, if this ſuſpenſion ſhall continue for any conſiderable time, the living principle being thereby extinguiſhed, death muſt be the infallible conſequence. I have often reaſoned in the ſame way on that ſtate of inſenſibility the body is inſtantly thrown into,

into, for a longer or ſhorter time, by a blow on the head, without fracturing the ſkull, rupturing a veſſel, or, from the moſt accurate examination, doing any apparent injury to the brain; and this effect was followed either by the recovery or death of the perſon, according to the violence of the blow, or ſtrength of the body to reſiſt its effects.

55. Indeed, every ſpecies of pain, ſuddenly and unexpectedly excited, has more violent effects on the ſyſtem, and is always attended with greater danger to life, than the ſame degree of it ſlowly and gradually inflicted. We are then, as it were, ſummoned to reſiſt its ſeverity. For, it is in this way that the horrid executions on the wheel, and other barbarous methods of putting malefactors to death, which diſgrace thoſe countries where ſuch execrable ſcenes are exhibited, ſhow the immenſe degree of pain the human body is capable of bearing; when brought on gradually, and

when

when the mind is prepared to repel its effects. But, even under these circumstances, this power has its limits; for there are many instances of those unhappy people dying under their excruciating torments before any injury was done to the brain, spinal marrow, or vital organs.

56. In parag. 29. to 33. I have mentioned the general effects of the passions of the mind in the production of diseases; and in the two preceding paragraphs, as well as in every case where pain exists, we have the clearest evidence that the mind is affected in proportion to the severity of the pain. This may be raised so high, as not only to suspend all the powers of the body, but even those of the mind, when death is the usual consequence. But this influence of the affections of the mind on the body, *et vice versa*, are seldom taken notice of as general or particular sympathies, though they are, perhaps, the most uniform and constant that exist in the human system.

This

This muſt be apparent to every man who ſhall take the moſt ſuperficial view of the conſequences of violent affections of the mind, or morbid ſtates of the body. The former never fails to bring on bodily diſeaſes; and it is univerſally known that the latter are, for the moſt part, the original cauſes of various diſorders of the mind.

57. In chronic diſeaſes, accompanied with a preternatural irritability in the nerves, and a variety of different complaints, ariſing from a morbid mobility of particular parts, as in hyſteric and hypochondriac patients, in perſons afflicted with the chronic aſthma, or with a fit of the gout, tooth-ach, or rheumatiſm, I have known theſe ſeveral diſorders ſuſpended for a time, when the mind has been under the influence of fear, ſurpriſe, or rouſed to a fixed attention to ſome intereſting object. I have frequently obſerved in practice, delicate hyſterical women, who, for many months, had ſeldom enjoyed one day's health, ſuddenly relieved

relieved from every complaint when a favourite child was attacked with a diſeaſe in which danger was apprehended, and they continued, in appearance, to be in perfect health during the whole courſe of the illneſs, and exhibited an unuſual alertneſs in diſcharging their duty as nurſes and as parents. But, when they underſtood that the danger of the diſeaſe was over, their former complaints gradually returned, to their great ſurpriſe; for, from ſo complete a ſuſpenſion of their complaints as they had lately enjoyed, and for ſo conſiderable a time, they believed themſelves to have been perfectly cured. A gentleman of great courage and honour, who had become valetudinary, and ſubject to the aſthma, by long ſervice in India, as an officer in the land forces, told me, that, during their encampment, he was attacked with a ſevere fit of that diſorder, which uſually laſted ten or twelve days: That, upon the third or fourth day of his illneſs, when he could only breathe in an erect poſture, and with-

out motion, imagining that it was not in his power to move ſix yards to ſave his life, the alarm guns were fired for the whole line to turn out, becauſe a party of the Mahrattoes had broke into the camp; and, fearing certain death if he remained in his tent, he ſprung out with an alacrity that aſtoniſhed his attendants, inſtantly mounted his horſe, and drew his ſword with great eaſe, which, the day before, he could not move from its ſcabbard, though he uſed his whole ſtrength in the attempt. From the inſtant of the alarm and ſurpriſe, the debility left him, together with the aſthma; nor did the diſorder return till its uſual period.

58. From the above inſtances, and others of a ſimilar nature, where the ordinary courſe of a diſeaſe, or the diſeaſe itſelf, is ſuſpended for a time, we have reaſon to believe, that, in diſorders of the body, as well as in thoſe of the mind, there is an irregular and an unequal diſtribution of the powers

ers of action, which ſeems to be rectified by a ſudden and continued exertion of the powers of the mind. This exertion gives a greater ſtability to the nerves as conductors. Their condition is immediately changed from a morbid to a more vigorous ſtate: The whole ſyſtem acquires ſuch a degree of ſtrength as enables it to reſiſt, in a ſurpriſing manner, the ordinary action of the cauſe of the diſeaſe. But, when this extraordinary excitement of the mind begins to languiſh, or ceaſes altogether, the cauſe of the diſorder ſtill exiſting in the body, its effect will be in proportion to the debility which has taken place in the ſyſtem, on the return of its former valetudinary condition. In ſome caſes, the diſeaſe recommences with the debility, whilſt in others, there is no return for a conſiderable time, (parag. 41. 42.) Theſe facts ſhow the neceſſity and great uſe of conſtantly employing the mind, either by buſineſs or amuſement, in the cure of certain diſeaſes accompanied

accompanied with a preternatural irritability of particular parts.

59. As a ſolution of opium taken into the ſtomach, injected into the bowels, or applied to any part of the body, ſo as to have its full effect on the nerves, never fails, in proportion to the quantity uſed, to leſſen or deſtroy the ſenſibility, and the powers of the nerves to which it is applied; and as theſe effects are ſpeedily communicated, in a leſs degree, to the reſt of the ſyſtem; in like manner, when any part of the body, from its diſeaſed ſtate, comes to be endued with ſuch a preternatural degree of irritability, as to be, from the ſlighteſt cauſes, almoſt in conſtant pain, and this for a number of days or weeks together, it has always the effect to render the reſt of the nerves irritable to a morbid degree, or, to uſe a term in muſic, to bring the reſt of the nerves to be more in uniſon with thoſe of the diſeaſed part than they were before. This effect of long continued

pain,

pain, in rendering the ſyſtem more irritable, is not, perhaps, ſo obſervable as the effects of opium in a contrary way. This drug, ſoon after its application, has its full force in leſſening the ſenſibility of the nerves, or in deſtroying their power, if uſed in a ſufficient quantity. But pain muſt either be long continued, or frequently repeated, or be in an extreme degree, before the ſyſtem in general can be affected. Beſides, as the habitual uſe of opium impairs the mental faculties, pain renders the mind more irritable than uſual. Every one knows the irritability of a perſon under a ſevere fit of the gout; and we are diſpoſed to apologize for an unuſual peeviſhneſs and impatience in our friends on account of ſuch indiſpoſitions as are conſtantly accompanied with an increaſed irritability of the ſyſtem.

60. From this view of the action of ſtimuli, and the general ſympathy of the ſyſtem with any part of it morbidly affected,

we

we have an eaſy explanation of the operations of poiſons. Under theſe are comprehended, not only ſuch ſubſtances as are, in very ſmall quantities, deleterious to the body, but ſome of our beſt remedies, which, when given in large doſes, may have all the effects of a ſtrong poiſon.

61. If we want to moderate the ſeverity of pain, or to take off a particular ſpaſmodic affection, in any part of the body, a doſe of laudanum or opium is preſcribed, ſuitable to the age, conſtitution, or habit of the patient in the uſe of this medicine. In a few minutes after its application to the nerves of the ſtomach, they become leſs ſenſible. The ſame diminiſhed ſenſibility is ſoon communicated to the whole nerves, and the pain in the diſeaſed part is proportionably abated, or entirely removed. But if we proceed in our application of the opium to the nerves of the ſtomach, as far as not only to ſuſpend the animal actions in ſleep, but even thoſe of the heart and lungs,

lungs, ſuch a quantity muſt put a period to the exiſtence of the animal.

62. We ſometimes meet with a patient who, from a ſingularity of conſtitution, diſagrees with opium in whatever form it is given. This effect is not peculiar to opium. It extends to other ſubſtances which uſually ſit light on the ſtomach. In ſuch people, a moderate doſe of laudanum excites vomiting, headachs, and other general diſorders of the body, which only happen to others when over-doſed. In ſuch caſes, and where the effects of an opiate are neceſſary for the removal of pain, or ſome ſpaſmodic complaints, a proper doſe of laudanum, mixed with a few ounces of water, ſhould be injected into the rectum. The nerves of the rectum bear the ſtimulus of opium much better than thoſe of the ſtomach. Hence the nerves of the rectum require double the quantity of opium requiſite to produce the ſame effect on thoſe of the ſtomach. But, when this unuſual irritability

irritability of the ſyſtem is removed, the ſtomach acquires the faculty of bearing opium with greater eaſe.

63. When, with a view to the good of mankind, we examine the nature and qualities of this poiſon, and its manner of operating on the body, we are under the diſagreeable neceſſity of killing dogs, and other animals. In caſes of this kind, ſmall doſes, repeated at proper intervals, prevent the opium from being thrown up by vomiting, which the immediate action of a large quantity is apt to excite. This is the reaſon why ſome perſons have eſcaped the fatal conſequences of a large doſe of laudanum, given by miſtake, or taken by deſign, which otherwiſe muſt have ended in the deſtruction of the powers of life.

64. Theſe circumſtances of pain, ſickneſs, and vomiting, which attend the exhibition even of ſmall doſes of opium in particular conſtitutions, or of large doſes in thoſe

thoſe who have been accuſtomed to uſe it, have ſuggeſted to ſome the idea of a double action of the opium, namely, thoſe of ſtimulant and ſedative. But, when its operation and various effects are attended to, they will appear to ariſe either from a peculiarity of conſtitution, a greater or leſs irritability of the nerves, or from a larger or ſmaller degree of the ſame ſtimulus. When the ſtomach has become too irritable, as happens after the operation of a vomit, or after the action of a quantity of acrid indigeſtible colluvies, a glaſs of brandy will excite vomiting, which might prove a cordial to the ſame perſon at any other time. There are few men whoſe ſyſtem poſſeſſes ſuch ſtrength as to reſiſt the fatal effects of a pint of new diſtilled ſtrong ſpirits, ſuddenly thrown upon an empty ſtomach. Moſt people, ſo bold as to hazard ſuch an experiment, would fall down in an inſtant as if ſhot through the head, and, if not relieved by vomiting, would die ſoon after. This evidently ſhows, that the pow-

er of the nerves of the ſtomach may be quickly deſtroyed by a cordial ſtimulus when raiſed to exceſs, and that theſe effects are, by ſympathy, communicated in a few minutes to the reſt of the ſyſtem, and produce a ſuſpenſion of all action.

65. Though the lauroceraſus be one of the moſt deadly poiſons, from a ſtimulus *ſui generis*, which, when highly concentrated by a ſtrong impregnation of an eſſential oil in water diſtilled from its leaves, yet we know that a weak impregnation of its poiſonous qualities may be uſed with impunity. Its leaves are boiled in milk for puddings, and otherwiſe employed in cookery, when the flavour and taſte of bitter almonds are deſired in the compoſition. Theſe ſeveral articles are taken in diet without any bad conſequence; for it is only the exceſs of this ſtimulus which proves a poiſon, and not that ſmall degree of it neceſſary to give a flavour to a diſh. It ought, however, to be baniſhed from every ſpecies of

of cookery, on account of the poſſibility of accidents to children and delicate conſtitutions: For, when taken in ſuch a quantity as to act on the ſtomach as a poiſon, its effects are often ſo quickly communicated to the reſt of the ſyſtem, as to prevent ſuch means from being uſed as might either aſſiſt in throwing it up, or in abating the violence of its peculiar ſtimulus on the nerves. In many inſtances, perſons have fallen down and expired ſoon after it had been taken.

66. But when we examine the body after death, ſuch is the nature of its ſtimulus, and likewiſe of moſt vegetable poiſons, that we learn little or nothing of their manner of operating on the body. When undoubted information is received, that the deceaſed had taken a deleterious ſimple, or compoſition, in ſuch quantity as is known to prove a poiſon to the human body; that, immediately after it was ſwallowed, ſuch ſymptoms aroſe as are uſually the conſequence

ſequence of the poiſon exhibited; that theſe ſymptoms increaſed in violence, and continued until they produced death; on ſuch occaſions, there can be little doubt as to the cauſe; and, if part of the poiſon is found in the ſtomach and bowels, the evidence amounts to a demonſtration. But, without theſe circumſtances, in our judicial declarations, we can prove nothing from any appearance in the body on diſſection: For the ſuffuſion of blood, ſometimes obſerved in different parts of the body, particularly about the face, neck, and breaſt, from the ſmall veſſels of the ſkin, is no more than what happens in almoſt every caſe of ſudden death, and even takes place ſometimes on a ſtop being put to the circulation, on the demiſe of people after chronic diſeaſes. Neither do thoſe ſlight degrees of redneſs, from the blood ſtagnating in the ſmall veſſels of certain parts of the coats of the ſtomach and bowels, after death, prove that any thing is unnatural or characteriſtic of particular poiſons. All

muſt

muſt be referred to the particular operation of the poiſon on the nerves of the ſtomach, by which their power of conducting the principle of life is deſtroyed. Its effects are, by general ſympathy, quickly communicated to the reſt of the ſyſtem, and produce a ſuſpenſion of all action, but without making the ſmalleſt apparent alteration on the ſtructure of the nerves or other parts.

67. What has been ſaid in this ſection, on the ſubject of ſtimuli, is a ſufficient refutation of the mechanical reaſoning of certain authors, in their explanations of the effects of medicines and poiſons on the body. For mechanical violence having a diſtinct and determinate operation, will vary only in its effects according to the force with which it is impelled; whereas thoſe ſubſtances capable of producing ſalutary or noxious effects on the body, are known to effectuate theſe by inducing certain changes on the ſtate of the nerves, which action we call ſtimulus. Theſe ſtimuli, however,

ever, according to the nature of the ſubſtance by which they are excited, appear to be extremely different from one another, each acting in a manner peculiar to itſelf, or with what is called a ſpecific ſtimulus: Of courſe, the affections of the nerves, from their application, and their conſequent effects on the ſyſtem, muſt likewiſe be different. It is only in this way of conſidering the ſubject, that we can have any tolerable view of the reaſons why certain diſeaſes differ from one another according to the nature of the cauſe acting on the body; which, from their action on the ſyſtem, produce various effects, according to the nature of the ſtimulus peculiar to each.

68. It is commonly imagined, by anatomiſts and phyſiologiſts, that every nerve, or filament of a nerve, is diveſted, at its termination, not only of that membrane we call a prolongation of the dura mater, but alſo that of the pia mater. It is neceſſary, ſay they, that each filament ſhould be laid bare

bare for the right performance of its office in the oeconomy. That the dura mater, which does not appear to ſerve any other purpoſe than to give a proper degree of ſtrength and firmneſs to the nerves, in their paſſage from the brain and ſpinal marrow, is thrown off, will not be diſputed; but I have, in Par. 7. given my reaſons for ſuppoſing, with that able and accurate anatomiſt Dr Monro, that every filament of a nerve retains, at its termination, a delicate covering of the pia mater, by whoſe veſſels the cineritious and medullary part of the nerve is nouriſhed, and thoſe conditions preſerved, on which depends their faculty of conveying the powers of action and of receiving impreſſions, in which they are variouſly aſſiſted by different contrivances ſuited to the function of the part where they terminate. In this way they are rendered capable of receiving impreſſions from particular ſtimuli which would not affect the reſt of the body: For it is by a particular ſtructure and organization

that

that the nerves, originally the ſame in the brain, are adapted to different purpoſes in the ſyſtem. This gives what may be called a variety of conſtitution to the nerves. They differ from one another according to the ſtructure, and ſometimes the mechaniſm, of the parts in which they terminate. Their powers are alſo various. In many parts they are endowed with a ſenſibility *ſui generis*, and different from thoſe of the reſt of the body.

69. It is the moſt aſtoniſhing and inimitable mechaniſm of the eye, and of the ear, which enables the one to receive the images of objects on the retina, and the other to perceive the different modulations of the air, by its action on the delicate nervous expanſion in the cavities of the internal ear. This is evident, when the ſight or hearing is impaired or deſtroyed by an injury done to any eſſential part of the eye or ear; for they cannot convey to the mind a juſt repreſentation of the figure and colour

colour of objects, or of the variety of ſounds; when any remarkable diſorder takes place in the mechanical apparatus of theſe animated machines. In the brain, the nerves of the eye and ear ſeem not to differ from each other, except in magnitude, or to poſſeſs any peculiar property which ſhould fit the optic nerve for viſion, more than the portio mollis of the ear; for, in many inſtances, we find that the ſame nerves are divided and ſubdivided for different purpoſes in the ſyſtem. For example, from the numerous diviſions of the fifth pair, branches are ſent to the eye, ear, noſe, tongue, teeth, lachrymal glands, to the ſublingual and other glands of the mouth, and in general to the ſkin of the face. Theſe ſeveral branches of the ſame nerve anſwer the different purpoſes of muſcular motion, ſenſation, glandular ſecretion, and nutrition; at leaſt, they aſſiſt conſiderably in theſe two laſt offices. The ninth pair, after giving ſome branches to the muſcles of the os hyoides, forms the or-

gans of taſte in the papillae rotundae of the tongue, in which its ultimate filaments terminate. To preſerve the ſenſibility of theſe filaments, they are always kept moiſt by a conſtant ſecretion of ſaliva; for, when they become dry, as in ſome fevers, the ſenſe of taſte is in a great meaſure loſt or perverted. Indeed, all the nerves of the body muſt be kept warm and moiſt for the preſervation of their powers. The care beſtowed by the author of nature, in this reſpect, on the organ of ſmelling, is truly amazing. The numerous excretory ducts, from the glands on the membrane lining the cavity of the noſe, would not have been ſufficient for this purpoſe. A great deal of moiſture is carried off by the conſtant paſſage of the air in reſpiration: Hence the ducts from the lachrymal ſack, frontal ſinuſes, ſecond bone of the upper jaw, os ſphenoides, and cells of the os ſpongioſum, all open on the inſide of the noſe. This organ has likewiſe a greater number of blood-veſſels beſtowed on its membranes than is to be found

found in any other part of the body. The great warmth afforded by these vessels prevents the olfactory nerve, spread over the os cribriforme and lamina of the os spongiosum, from being too much cooled by the constant application of the air, and evaporation of the secreted liquors. It is this evaporation of the moisture, with which the nose of the dog is constantly bedewed, that produces so great a degree of cold, at all seasons, in his nose, notwithstanding the immense number of blood-vessels spread through its membranes.

70. Were we to take a view of the rest of the nerves terminating in the papillae piramidales of the skin, on the internal surface of the bronchi and substance of the lungs, heart, diaphragm, pleura, inner coats of the stomach and bowels, of those going to the glands of the liver, pancreas, kidneys, testicles, uterus, bladder, parts of generation, &c. we should not be able to discover the smallest difference amongst them, except,

except, perhaps, in their manner of terminating, or rather in their acquiring a variety of powers and irritability, according to the particular organization of the parts.

This variety of irritability in different parts of the body is, to me, the moſt probable cauſe of the mobility in certain parts of the ſyſtem from particular ſtimuli, whilſt the other parts generally appear to be unaffected, unleſs in the way of general ſympathy. It is from this circumſtance we muſt account for the action of morbid ſtimuli, and of particular medicines, on certain parts of the body, which are ſo frequently obſerved in the progreſs and cure of diſeaſes.

SECTION

SECTION III.

OF THE EFFECTS OF HEAT AND OF COLD.

71. THOUGH it is not my intention, in this ſection, to proceed farther than ſome obſervations on the effects of heat and of cold on the human body, yet, as an author of conſiderable abilities has lately favoured the public with a treatiſe on animal heat, where the ſubject is proſecuted in the way of experiment, with great judgment and capacity as well as candour, I could wiſh to take a general view of the theory of this ingenious gentleman.

72. He ſets out with a fact, generally known and proved by experiments, that all bodies hold, in their compoſition, a certain portion of fire as a principle; but that

the quantity varies in different bodies, according to the other principles of which they are compoſed, their proportions to one another, their mode of union, or, in other words, according to the nature of the ſubſtance; and this fire, in a latent or quieſcent ſtate, it not being meaſurable by the thermometer, is called by the name of abſolute heat.

73. That, when equal quantities of different ſubſtances have a given quantity of heat thrown into them, their temperature by the thermometer will appear different. For the ſame quantity of heat, which raiſes one body a certain number of degrees, will raiſe another to a greater or leſs number; and this is called the capacity of the body for containing abſolute heat.

74. The Doctor next proceeds on a ſuppoſition which he endeavours to ſupport by a number of experiments, that, when phlogiſton is added to a body, it leſſens its capacity

capacity for containing abſolute heat, and when abſtracted from it, its capacity for heat is thereby increaſed. Heat, therefore, and phlogiſton appear to be two oppoſite principles in nature. By the action of heat upon bodies, the force of their attraction to phlogiſton is diminiſhed, and by the action of phlogiſton, a part of the abſolute heat, which exiſts in all bodies as an elementary principle, is expelled.

75. From the Doctor's view of the origin of animal heat, it ſeems to depend on a proceſs ſimilar to a chemical elective attraction. The air is received into the lungs containing a great quantity of abſolute heat. The blood is returned from different parts of our body highly impregnated with phlogiſton. The attraction of the air to the phlogiſton, aſſiſted by the heat in the lungs, is greater than that of the blood. This principle will, therefore, leave the blood to combine with the air. By the addition of the phlogiſton, the air is obliged to depoſite

a part of its abſolute heat; and, as the capacity of the blood for receiving heat is at the ſame moment increaſed by the ſeparation of the phlogiſton, it will inſtantly unite with that portion of heat which had been detached from the air. But the blood, in the courſe of the circulation, abſorbing phlogiſton, and thereby having its capacity for containing abſolute heat diminiſhed, part of it, in proportion to the quantity of phlogiſton abſorbed, breaks out in the form of ſenſible moving heat, and is the principal ſource of animal heat.

76. This is, at leaſt, a more plauſible theory on this ſubject, ſupported by experiments, and corroborated by many phaenomena in the animal oeconomy, than has hitherto been given by former writers. But, notwithſtanding my partiality to this theory, ariſing from the great probability of its truth, yet I cannot altogether give my aſſent to the Doctor's way of reaſoning with regard to the manner in which the animal

animal heat is ſupported. For, allowing it to be true, that, when phlogiſton is abſtracted from any body, its capacity for containing abſolute heat is thereby increaſed, I cannot perceive how the abſolute heat abſorbed by the blood from the air inſpired, ſhould become the ſource of the animal heat in the courſe of the circulation, at leaſt, in the manner in which it is ſuppoſed to be done by Dr Crawfurd; for, in the double exchange of phlogiſton from the blood for fire from the air in reſpiration, no increaſe of heat is raiſed in the lungs, becauſe it is ſuppoſed, that, as the capacity of the air is diminiſhed on receiving the phlogiſton, that of the blood on parting with it is proportionably increaſed for containing abſolute heat. But why does not the ſame way of reaſoning apply to the abſorption of phlogiſton by the blood in the courſe of the circulation; or, as he has chiefly placed it in the vaſa minima, for the fluid or ſubſtance which parts with its phlogiſton, ought inſtantly to have its capacity for con-

taining abſolute heat enlarged, and, of courſe, ſhould receive it as a principle in its compoſition, from that portion of the blood which has abſorbed its phlogiſton, and has thereby its capacity for containing abſolute heat proportionably diminiſhed? Let us rather ſuppoſe, that ſuch a double exchange of principles, as is mentioned above, takes place in reſpiration, that part of the fire extricated from the air is expended in converting that quantity of moiſture into vapour which is known to accompany reſpiration, the reſt is abſorbed by the blood, which, in the courſe of the circulation, being neceſſarily kept in that degree of heat peculiar to the animal, and having ſeveral fluids ſecreted from it, different in their nature from one another, and ſome of them in conſiderable quantities, &c. it is reaſonable to ſuppoſe, that ſuch a change from the ſtate it poſſeſſed in the large arteries, gradually takes place, as leſſens its capacity for containing abſolute heat, and, of courſe, there will be a gradual

dual extrication of part of that fire it held as a principle in active measurable heat. This is confirmed by the Doctor's experiments, which shew that the capacity of the arterial blood for containing absolute heat, is to that of the venous as 115 to 100; consequently, the same degree of heat which would raise the venous blood 115, would raise the arterial only 100, the difference being absorbed by the latter, in the form of absolute heat.

77. In a very ingenious paper of Dr Crawfurd's, written with a design to inquire into the origin of that power animals possess of preserving nearly an equal temperature, when placed in intense degrees of cold, he proceeds on this supposition, that, admitting the sensible heat of animals to depend on the separation of absolute heat from the blood, by means of its union with the phlogistic principle in the minute vessels, he is of opinion that there is a certain temperature at which that fluid is no longer capable

pable of combining with phlogiſton, and, of courſe, it muſt ceaſe to give off heat. He is confirmed in this idea from obſerving, that, when dogs are kept in air or water heated above their temperature, for a conſiderable time, their venous blood becomes gradually paler and paler in its colour, till at length it acquires nearly that of the arterial, from which he concludes it to be leſs impregnated with phlogiſton than formerly. From this hypotheſis he imagines, that, in proportion to the degree of heat the blood receives, *ab extra*, above that of the animal heat, it will become leſs and leſs impregnated with phlogiſton, and even goes ſo far as to alledge, that, when heated to a certain degree, it neither will abſorb phlogiſton in the courſe of the circulation, nor give it off in the lungs in reſpiration. Hence he concludes, that, when animals are placed in a temperature above their own, there will be a gradual decreaſe of the quantity of phlogiſton abſorbed from the blood by the air in reſpiration; and the quantity of

fire

fire depoſited in the blood by the air will be proportionably diminiſhed, till at laſt a ſtop is put altogether to that proceſs of a double exchange of fire for phlogiſton in reſpiration, and, of courſe, to the ſource of animal heat.

78. The experiments made by Dr Crawfurd with living and dead frogs, and afterwards with dogs, in air and in water, heated conſiderably above their temperature, ſhew evidently, that living animals poſſeſs a power, to a certain degree, of preſerving their natural temperature for ſome time when expoſed to a heated medium. But I am ſorry that I cannot agree with the opinion of this ingenious gentleman, with regard to the manner in which this power is ſaid to be produced, which he imagines is owing to the attraction of the blood for phlogiſton being diminiſhed in proportion to the degree of heat in which the animal is placed, and the time of its application. I have ſuppoſed, with ſome probability, in

parag.

parag. 76. that the abſorption of phlogiſton in the ſmall veſſels does not take place, but that the blood itſelf, for reaſons therein mentioned, in the courſe of the circulation, is gradually undergoing ſome change, by which its capacity for holding abſolute heat is diminiſhed. But, ſuppoſing this conjecture of mine to be a miſtake, and that the arterial blood does, in the ordinary temperature of the body, abſorb phlogiſton during the courſe of the circulation, ſtill I am not ſatisfied that the increaſe of a few degrees of heat ſhould leſſen or deſtroy this power. For I do not imagine that the venous blood becoming paler, and nearer to the colour of the arterial, when the body is expoſed to a high degree of heat in the air, or is immerſed in water, 120 or 130 degrees warm, for ſome time, is owing to its being leſs impregnated with phlogiſton than before the experiment was made, and the blood was in a cooler ſtate; this is a mere conjecture, and what cannot fairly be concluded from the experiment; but

this

this we are certain of, that it has acquired a larger portion of both abſolute and meaſurable heat, which may be the true cauſe of the ſmall change brought on the colour of the venous blood under ſuch circumſtances; which opinion I embrace the more readily, from obſerving that the blood in the lungs becomes ſuddenly paler, from an abſorption of fire as a principle from the air, and is a ſtrong proof of Dr Crawfurd's diſcovery with regard to the double exchange in the lungs, as narrated above, in reſpiration. Neither does it appear that the quantity of phlogiſton abſorbed by the air from the blood in the lungs is at all diminiſhed; for, from the increaſed velocity of the blood, reſpiration is more quickly performed; and it is highly probable, that, in equal ſpaces of time, a larger quantity of atmoſpherical air is converted into fixed air, and likewiſe a more conſiderable portion of fire is abſorbed by the blood from the air, which, in its heated ſtate, muſt, like all other fluids, contain more abſolute heat

than

than it can do in a lower temperature. At the ſame time, it muſt be obſerved, that this increaſe of fire from the heated air is much diminiſhed by a more copious evaporation of moiſture from the lungs. But I do not imagine that this can ever be ſo conſiderable as to ſink the temperature of the blood in the lungs ſo low as the Doctor's calculation of 30 degrees, when the whole of the fire ſeparated from the air in reſpiration is expended in the formation of vapour, which I do not imagine can ever be the caſe.

79. As I have taken the liberty to differ from Dr Crawfurd, with regard to the mode in which that power in animals is produced, whereby they are enabled to maintain nearly the ſame temperature under different degrees of heat, it is reaſonable to expect I ſhould proceed to give my own opinion relative to the manner in which this power is exerted in the animal body. This I ſhall endeavour to do in the following

ing pages, though not, perhaps, with that ſucceſs I could wiſh, in the proſecution of ſo important a ſubject.

80. From the commencement of animal life, there is, from certain operations in the oeconomy, a conſtant generation of heat; whilſt from others, and our living in a medium below the temperature of our bodies, there is a continual conſumption of heat.

81. This cannot ſtrictly be underſtood to take place till after birth; for, in the primordia of animals, and, for ſome conſiderable time after conception, if the operations in the oeconomy capable of producing heat can be ſaid to exiſt, they muſt be carried on in ſo languid a manner as to be altogether inadequate to the end of ſupporting the powers of life. By theſe powers, every action in the oeconomy of the foetus, as well as in that of the adult, is produced; all tending, by the aſſiſtance of peculiar laws, to the growth and perfection of the

animal. But this want of power in the organs of the foetus, for the generation of heat, is ſupplied by the mother for a certain time, or until its organs has acquired a degree of ſtrength ſufficient for the due performance of their ſeveral functions. About this time the birth of the animal, reſpiration, and a new circulation through the lungs, take place. With the commencement of reſpiration, heat begins to be generated in the body, or, at leaſt, in greater quantity than before. For it is highly probable, that the foetus, whilſt in utero, depends chiefly, if not ſolely, on the mother for the heat it poſſeſſes, otherwiſe ſuch an accumulation of it would ariſe as might be incompatible with the exiſtence of life. The proceſs of incubation is, I apprehend, ſufficient to eſtabliſh this obſervation.

82. In the rudiments of the chick, there are little or no powers capable of generating heat. It remains in the ſame ſtate as when the egg was excluded, till the proceſs of

of incubation commences, when it receives heat from the mother. This heat excites the principle of life into action. A more vigorous circulation takes place; the gradual extenſion and growth of the parts commence. The organs begin to unfold, to acquire ſtrength, and, in ſhort, this myſterious proceſs of the growth and formation of the foetus goes on by the aſſiſtance of the heat communicated to it by the mother. During the time of incubation, the living principle every day increaſes in quantity and power with the perfection of the animal, and the capacity of its organs for performing its functions and generating heat, which laſt does, probably, not happen till the time of its excluſion from the ſhell. After which, the chick does not depend entirely on the mother for the production of that heat, which muſt always accompany and ſupport the powers of the principle of life. Reſpiration has commenced, the motion of the heart, the circulation, and other operations, are carried on with

with greater vigour than formerly, and are capable, in a great meaſure, of generating a degree of heat equal to that of the parent. But the mother, by a wonderful inſtinct, as if conſcious of the tender ſtate of her children, and of the impoſſibility of their being kept ſufficiently warm by their own powers, gathers them under her wings to cheriſh that vital warmth which ſhe appears to judge them incapable of ſupporting, and without which they would neceſſarily periſh. In the human ſpecies, reaſon and experience produce the ſame end. We employ the heat of the fire, warm clothes, or we lay the infant in bed with the mother. But if, during incubation, the hen leaves her neſt ſo long as to cool the eggs a few degrees, from that period the powers of life are proportionably diminiſhed, and a ſtop is put to the growth of the chick; both of which, if the eggs have not been cooled too far, are recoverable on the return of the hen, and that genial heat they receive from her body. The mother is ſo

ſolicitous

ſolicitous to preſerve this heat, that ſhe ſeldom leaves her neſt above five or ſix minutes in the day, to take a ſlender repaſt, and when ſhe diſcovers the motion of the chickens in the eggs, ſhe then ſits ſo cloſe, that even the ſight of food, though ever ſo much preſſed by hunger, can ſcarcely prevail with her to ſtir from the eggs for three or four days, or until they are completely hatched. But if ſhe abandons her neſt altogether, or is killed by accident, then, as the eggs cool, the powers of life gradually decline, till they are at laſt totally aboliſhed by the death of the chickens.

83. This generation and conſumption of heat are ſo wonderfully balanced in the human ſpecies, while in health, notwithſtanding the great variation in the temperature of the air, the differences of climate, ſeaſons, ſituations, and viciſſitudes of the weather, that an opinion has been entertained, that the living body poſſeſſes a power of reſiſting, for a certain time, any addition of heat

heat to that healthful ſtandard eſtabliſhed by nature, or any diminution of it, when the body is placed in a temperature conſiderably above or below its own. In ſupport of this idea many intereſting experiments have been made *, and by ſo great a number of gentlemen of abilities and candour, as muſt render it extremely difficult to take a different view of the operation of air heated above our temperature, from what has already been given by ſo many reſpectable characters. But, notwithſtanding their high credit with the public, I cannot implicitly aſſent to the concluſions drawn from their experiments, that the living body poſſeſſes a power of reſiſting the effects of heat, or of deſtroying it, when placed in an air heated greatly above its own temperature. It muſt be allowed, that the principle of life poſſeſſes, in various ways, moſt amazing powers; but that it ſhould be endowed with a property of obſtructing

* Phil. Tranſ. vol. 65. pag. 111. 463. &c.

obſtructing the ordinary effects of heat, or of deſtroying it, is a faculty of ſo ſingular a kind, that I doubt much if it can poſſibly exiſt in nature. Neither does it appear, from the experiments inſtituted in proof of this opinion, that any ſuch power was exerciſed, at leaſt, in the manner in which it has been ſaid. Nor is there any neceſſity for having recourſe to ſuch ambiguous aſſertions, calculated more to raiſe our aſtoniſhment than to give us the ſmalleſt information relative to the manner in which this wonderful effect is produced in the living body, which, I apprehend, will admit of as ſatisfactory an explanation as can be given of moſt of the operations in the animal oeconomy.

84. The exerciſe of the full powers of the living principle appears to depend on a certain degree of heat in the animal, which nature ſeems to have fixed in the human ſpecies at 96, 97, or 98 degrees of Fahrenheit. It varies a degree or two in different

different conſtitutions; but ſeldom riſes above 98, except in morbid ſtates of the body. This ſtandard point of heat nature endeavours to adjuſt with great preciſion, becauſe every deviation from it is conſtantly accompanied with a proportionable decline of the powers of life. To accompliſh this balance of heat and cold, and, of courſe, to prevent any remarkable change in our temperature, various actions are, by turns, excited in the body for the production of heat or cold, and for that degree of either which beſt correſponds with the exact regulation of the ſtandard heat. For the actions excited in ſupport of this indiſpenſible law in the oeconomy, will always be carried on with a degree of vigour proportioned to the ſtrength of the ſtimulus applied, or the preciſe manner in which our ſyſtem is affected by the exceſs of heat or of cold.

85. In a temperate air, an expreſſion which will admit of ſome latitude with regard

gard to the difference of conſtitutions, and the inhabitants of different climates, theſe operations are carried on with ſo much eaſe, that we do not perceive the ſmalleſt fatigue from their continued action. On the contrary, our ſtrength and ſpirits are good, and we enjoy an alacrity of mind and body which does not accompany the extremes of heat or of cold; becauſe, in the one caſe, the refrigerating power of the air, a gentle perſpiration, and the evaporation from the lungs in reſpiration, are ſufficient for carrying off that ſurplus of heat which would otherwiſe accumulate in the body. But, in an air extremely hot or cold, a certain degree of violence is exerted on the body, and the ſyſtem is excited to ſuch actions as correſpond with the nature of the ſtimulus, which may be ſo violent as even to exhauſt the whole powers of life in a very little time. It is only in this way we can take any tolerable view of the manner in which the living principle occaſionally exerciſes this wonderful power of reſiſting,

or rather obviating the effects of ſuch degrees of heat or cold in the air as are conſiderably above or below that temperature, which ſerves as a balance to the powers of generating heat, when this proceſs is not excited by any violent ſtimulus, but is carried on with eaſe, and without fatigue, by the natural ſtimuli of the ſyſtem. Although, therefore, we may ſay, with thoſe learned gentlemen, that the living body is endowed with a power of obviating, for a certain time, the effects of heat, when placed in a temperature conſiderably above its own, yet we cannot aſſent to the opinion that it poſſeſſes a power of reſiſting that known property of heat by which the exceſs of it, in every heated ſubſtance, is diffuſed through the ſurrounding bodies. But I imagine the faireſt method of deciding this caſe, would be to take a view of the effects of the external application of heat to the body, as was practiſed in theſe experiments; and, in this way, we ſhall have an

opportunity

opportunity of making ſome remarks on the principal facts which attended them.

86. The application of heat to the body never fails to quicken the pulſe, and to increaſe the perſpiration, in proportion to the degree of it applied, whether the body be expoſed to a dry or moiſt air, but eſpecially to the latter, which ſo remarkably relaxes the ſolids, and particularly the ſecretory veſſels of the ſkin.

87. By the heart and arteries being thus ſtimulated to a more frequent and vigorous repetition of their motions, there is an unuſual production of heat in the fluids, from an increaſe of the powers by which it is generated, the quantity of heat extricated from the blood correſponding in a remarkable manner with the velocity and force of the circulation. For, whether the circulation be accelerated by exerciſe, or the external application of heat, there is a proportionable production and increaſe of it; and,

and, were it permitted to accumulate, would ſoon riſe conſiderably above the animal heat. The conſequence of this accumulation would be an extinction of the powers of life, and of the functions depending on them; for life can only exiſt for a ſhort ſpace, when heated to any remarkable degree above its natural ſtandard. But the ſame infinite wiſdom which created and animated our machine, has inſtituted certain laws or regulations in the oeconomy, for its preſervation, as appears moſt evident when the vaſcular ſyſtem is ſtimulated in the manner above mentioned. For, from the increaſed motion of the blood, and the relaxing effects of heat, a ſweat is produced, proportioned to the cauſe exciting it, which contributes conſiderably towards carrying off the ſurplus of heat. But, as Nature, while the body is in health, diminiſhes not her powers in fruitleſs exertions, no ſweat is excited till the body is heated ſome degrees above its uſual temperature, or is raiſed to what may be called the ſweating point.

point. And as life could not exiſt any conſiderable time under a farther accumulation of heat, this addition to the ordinary quantity, proves a ſtimulus to the ſyſtem, ſufficient for the production of ſweat, which is the principal means employed by Nature to carry off the ſuperabundant quantity. In this way, an exact balance is nearly kept up between the generation and conſumption of heat; for the refrigerating effects of perſpiration muſt be more conſiderable than is commonly imagined, ſince it appears from the calculation and authority of two very able and accurate men in philoſophical experiments *, that 800 degrees of heat are neceſſary for turning water into vapour in diſtillation, ſuppoſing the whole to be in an active ſtate.

88. When any ſubſtance is expoſed to ſuch high degrees of heat as were uſed in the

* Dr Black Prof. chem. univ. Edin. and Dr Irvin Prof. chem. univ. Glaſ.

the above experiments, this heat muſt flow into the ſubſtance with a velocity proportioned to the conducting power of the medium and the capacity of the body for receiving it; conſequently, any ſubſtance of ſo looſe and ſpungy a texture as the human body, muſt receive heat, conducted by ſo rare a fluid as air, in a very ſlow manner, eſpecially if the perſon be ſurrounded with woollen clothes, which are very bad conductors of heat. Beſides, we ought to conſider the great bulk of the human body, which, when placed in air heated even to the boiling point of water, muſt, ſuppoſing it to be a maſs of inanimate matter, require a conſiderable time before it can be heated throughout only a few degrees above its natural temperature; but, as an animated body, from the inſtant of the application of this uncommon warmth to its ſurface, Nature is employed in counteracting the effects of the heat, by the refrigerating proceſs of ſweating, and the conſequent

quent expenditure of heat in the formation of vapour.

89. We may eſtimate the volatility of fluids by their power of attracting the element of fire as a principle, in the formation of them into vapour. How ſoon does the mercury in the thermometer cool by by the ball being kept wet with cauſtic ſpirit of ſal ammoniac, or vitriolic aether? And the degree of cold that may be produced in this way has been ſufficiently ſhown by the learned and ingenious Dr Cullen*. It is true that water, which I conſider as ſomewhat ſimilar to the matter of perſpiration, is much leſs volatile than the fluids juſt mentioned. As it attracts the heat from the air, but more particularly from the body with which it is in contact, more ſlowly, it is longer in acquiring the form of vapour. Notwithſtanding its effects in cooling the bodies from which it is evaporated is conſiderable, witneſs the ice

* Phyſical and Literary Eſſays, vol. 2. p. 145.

ice found in the morning on linens hung out to dry during the night, with the temperature of the air at 40°, the practice in cooling wine in warm countries, by hanging up their bottles in wet clothes to the ſun, to expede the evaporation, the cooling of the wine going on in proportion to the quickneſs with which its heat is abſtracted by the vapour. We may alſo take notice of the manufactures of ice in certain diſtricts of India, where the thermometer was never known to ſink ſo low as the freezing point *. I ſhould not have inſiſted ſo much on the effects of evaporation, had I not conſidered it as a material circumſtance in examining the effects of heated air on the human body, which, ſooner or later, according to the degree of heat it poſſeſſes, produces, in the manner above mentioned, a ſweat, and conſequent evaporation from every part of the body. Not that the whole of the matter perſpired is turned into vapour; it is only ſuch a portion

* Philoſ. Tranſ. vol. 65. p. 252.

tion of it as can readily abſorb the neceſſary quantity of heat from the body and external air, which will be in proportion to the degree of heat they poſſeſs, the reſt running in drops off the body, or is abſorbed by the clothes, part of which is afterwards evaporated from them: And as every body muſt become colder, from whoſe ſurface an evaporation is conſtantly kept up, whatever the degree of heat in the air may be, I can ſee no reaſon why the living body ſhould be an exception; for, were it not on account of the ſource of internal heat with which it is endowed, it would no doubt be ſubjected to the general effect of evaporation, which is to rob all bodies of a quantity of heat proportioned to the degree with which this proceſs is carried on.

90. When the air is of that particular temperature, which, with the aſſiſtance of other operations in the oeconomy, is juſt ſufficient for carrying off ſuch a quantity

of the heat generated in the body, that the remainder ſhall exactly ſupport the animal heat, we ſay ſuch an air is mild, or it is temperate; becauſe we are not ſenſible of any troubleſome degree of heat or of cold. This preciſe temperature varies in different people, according to the climate, age, and conſtitution of the individual; but at whatever point of the thermometer this temperature may be, if it riſes or falls a few degrees only, we then complain of heat or of cold, and employ various ways of obviating their diſagreeable effects. Though the heat be much below the temperature of our bodies, we feel it warm, partly from that facility with which experience teaches us readily to compare one degree of heat with another, but chiefly from an inſtantaneous retention of part of the heat generated, which uſed to be carried off by the cooler air. From the moment this commences, our pulſe begins to quicken, a more free perſpiration ſucceeds; and, if a further accumulation takes place, a ſweat is brought

on,

on, proportioned to the ſtimulus, from the exceſs of heat. In ſuch a ſituation, in rooms accidentally over-heated by fires, or by a croud of people, though we often bear the heat for ſome time without much inconvenience, yet if we remain long in it, or if it increaſes, it never fails to bring on more or leſs of debility and languor, as was evidently the caſe with thoſe gentlemen formerly mentioned, who ſubmitted themſelves to ſuch high degrees of heat. They mention this circumſtance, as well as a ſhaking of their hands, and other ſymptoms, all tending to prove, that, during the time they remained in theſe heated rooms, there was an unuſual exertion of the powers of life in obviating the effects of heat, in the manner already explained; which alſo ſhows that theſe powers are limited, and may be totally exhauſted by an over exertion of them, occaſioned by an exceſs of ſtimulus.

91.

91. Notwithſtanding the means uſed by nature for the exact regulation of the animal heat, we find, that, when the body is expoſed to ſuch an high temperature of the air, as ſhall, in eight or ten minutes, quicken the pulſe to double its uſual number, ſo violent and rapid a circulation muſt produce ſuch a degree of heat as cannot be altogether expended in the manner above mentioned; of courſe, there will be an accumulation of part of the heat generated. This, according to the accounts given us by thoſe ingenious gentlemen Doctors Blagden and Dobſon, raiſed the thermometer ſeveral degrees above the ordinary heat of the body; for, in the caſe of the delicate young man, narrated by Dr Dobſon *, after being expoſed to a heat of 224°, his body raiſed the thermometer to 102°. But theſe few degrees above 97 or 98° by no means indicate the full quantity of heat accumulated. They only ſhow the meaſure of ſenſible

* Philoſoph. Tranſ. vol. 65. p. 463.

ſenſible heat acquired by the blood, but not the quantity of fire abſorbed by it as a principle, under which form, like all other principles, it loſes the obvious qualities it poſſeſſed in a ſeparate ſtate; of courſe, it gives no addition of heat to the blood, and is therefore ſaid to be in a latent or quieſcent ſtate. But, to eſtimate the quantity under this form, correſponding to the riſe of a certain number of degrees of meaſurable heat in the blood, would require a ſeries of nice and accurate experiments, which my time at preſent will not permit me to enter upon. Neither am I very ſolicitous on this head, as it may be ſufficient, for a further illuſtration of my ſubject, to obſerve, with that very accurate philoſopher Dr Black, in his excellent courſe of Lectures on Chemiſtry, that the fluidity of all bodies depends on a certain portion of the elementary fire, which they hold as a principle in their compoſition, and conſequently is not meaſurable by the thermometer; that the quantity varies widely in different fluids,

but

but in the ſame fluid is, in a great meaſure, in proportion to the heat it contains in an active ſtate, though not exactly ſo; for, as I have elſewhere obſerved, no fluid that I have ever yet tried, appears to riſe in its temperature, when placed in a ſand heat or water bath, with a preciſe regularity. The increaſe of the ſenſible heat, indicated by the thermometer in equal times, varies a little almoſt in every obſervation. This irregularity in heating is greater in ſome fluids than in others; and I likewiſe ſuppoſe, that the ſame irregularity takes place with reſpect to the quantity of fire it receives as a principle. Thus, water at 50° does not contain ſo much heat in a latent ſtate as that whoſe temperature is raiſed to 70°; and ſo on until we bring it to boil, at which point it has received the largeſt quantity of heat, as a principle, it is capable of retaining. It then begins to riſe more copiouſly in the form of vapour, which carries off any addition of heat that may be thrown into it after it arrives at the

boiling

boiling point of 212°. But, when this water is removed from the fire, and placed on the ground, as it imparts its exceſs of heat to the air and ſurrounding bodies, and of courſe every inſtant becomes colder, it alſo gives out a proportionable quantity of its latent heat, which, by immediately aſſuming the form of active meaſurable heat, in ſome degree keeps up the temperature of the water, by ſupplying the place of part of the ſenſible heat carried off.

92. From theſe facts, it is eaſy to perceive the reaſon why the ſame quantity of different fluids, contained in ſimilar veſſels, and expoſed to the ſame degree of heat or cold, riſe or fall in their temperature, with very different celerities. Water heats and cools much more ſlowly than mercury. But theſe and many other phenomena relative to the hiſtory of fire, not being ſo immediately connected with our ſubject, I ſhall only farther obſerve, that the rapid circulation brought on by the ſtimulus of

an

an exceſs of heat in the above experiments not ſubſiding to its uſual ſtandard in leſs than two hours, and the perſons on whom the experiments were made not feeling any diſagreeable ſenſation from the cold, on expoſing themſelves to the air cooled ſome degrees below the freezing point, muſt be entirely owing to the accumulation of heat, both in a ſenſible and latent ſtate; and, as the air is but a ſlow conductor, eſpecially when our bodies are covered with woolen clothes, we muſt ſuppoſe that the exceſs of heat is very gradually carried off. Beſides, as it eſcapes ſlowly, the latent heat, for the reaſons already mentioned, breaking out in an active ſtate, muſt ſomewhat retard the cooling of the body, which is further impeded by the briſkneſs of the circulation. For, although its velocity is obſerved on ſuch occaſions ſenſibly to decreaſe every two or three minutes; yet, in proportion to its deviation from the uſual ſtandard of the perſon, in point of quickneſs, there will be a proportional generation of heat in the

blood

blood above its natural quantity, in ſo far as this may depend on the ſtate of circulation for its production.

93. The frequent colds which have been caught by people who have been over-heated by exerciſe, remaining for a conſiderable time in warm rooms, drinking freely of warm punch, or other exhilarating liquors, and afterwards expoſed themſelves to the air in cold weather, have very properly created a general precaution againſt the bad effects of cold air on ſuch occaſions. Moſt people are, from experience, ſatisfied that, if they could be ſpeedily moved, without loſing much of the heat they have acquired, to their houſes, where they might have an opportunity of cooling gradually to their natural ſtandard, the danger of a catarrh would be obviated. This end they endeavour to accompliſh by an addition of warm clothes, getting into carriages, ſedan chairs, or by walking briſkly home, where warm pediluvia, &c. are alſo of uſe; by

which means, the heat of their bodies being in a great measure preserved, they are more ready to escape with impunity. For, by whatever means the pulse is quickened, and the body heated beyond what is natural to the constitution, during the time they remain in this state, there is a proportional exertion of the powers of life above what is commonly expended in cooler conditions of the body; the consequence of which is, that the excess of heat being carried off, more or less of languor succeeds, until the strength is recovered by rest or some cordial drink. For, after the body has been kept unusually warm for some time, if cooled suddenly, the circulation and heat are apt to fall below what may be called par. In such a situation, our system not being so capable, as at other times, of resisting the effects of cold air; such a morbid affection of the body takes place, as usually precedes the accession of a catarrh. Hence we may conclude that method to be the best, for the prevention of colds in persons over-heated, which

which ſhall moſt effectually provide againſt their cooling too ſuddenly, and, at the ſame time, maintain a proper degree of ſtrength in the circulation until the body recovers its diminiſhed powers, and returns to the ſtate it poſſeſſed before it was over-heated. But, when the heat is ſo greatly increaſed as to raiſe the pulſe nearly to double its uſual number of beats in a minute, as was the caſe with thoſe perſons who ſubjected themſelves for ſome time to ſuch high degrees of heat, there can be little or no danger of a catarrh in walking home, even to a conſiderable diſtance, in the ſevereſt froſt; eſpecially if unaccompanied with much wind, or a fall of ſnow. But, in ſo ſtill an air as commonly attends intenſe froſt, there is little hazard of ſo great an exceſs of heat being ſoon carried off; and as every conſiderable deviation from the ſtandard heat is always attended with more or leſs uneaſineſs, the cool air, when one is ſo much over-heated as thoſe gentlemen were, muſt

rather

rather be agreeable and refreſhing than otherwiſe.

94. From this view of the effects of heat applied to the body, or accumulated in it, by an accelerated circulation, it is eaſy to comprehend the reaſon why, in fevers, when the heat of the body is much increaſed, the powers of life are thereby greatly diminiſhed. The heat at this time has undoubtedly a greater effect than uſual, from the general debility of the body, occaſioned by the long continued action of the cauſe of the diſeaſe, &c.

95. In ſupport of the ſame law in the ſyſtem, by which a certain quantity of heat muſt be maintained, and no more, the living body is endowed with a power alſo of reſiſting the effects of cold to a certain degree. We can live a conſiderable time in an air cooled greatly below the freezing point, without injury to the body, or the ſmalleſt decreaſe of its ſtandard heat.

96.

96. When the papers containing experiments and obſervations in heated rooms were preſented to the Royal Society, in which it was ſuppoſed that the living body poſſeſſed a power of reſiſting heat, or of deſtroying it, when placed in an air greatly above its own temperature, Mr John Hunter of London, whoſe literary purſuits have contributed ſo conſiderably to the advancement of natural knowledge, recollected ſome experiments made by himſelf in the year 1766, with a view to determine the queſtion, whether an animal could retain life after it was frozen, as had been confidently, but falſely, aſſerted with regard to fiſhes and ſnakes; and, recalling to his remembrance certain circumſtances attending theſe experiments, he imagined that he diſcovered an oppoſite power in animals, by which they are capable of reſiſting any external cold applied to them while alive, by generating within themſelves a degree of heat ſufficient to counteract the effects of cold. The dormice, carp, and other

ther animals, ſubjected by him to the ſevere cold of a freezing mixture, maintained, for a conſiderable time, a quantity of heat ſufficient for the continuance of life. They were at laſt frozen. But theſe experiments were always attended with the complete death of the animals. The great variety of temperature which the more imperfect animals are capable of bearing muſt contribute conſiderably towards the ſtrong retention of life they poſſeſs in very low degrees of heat. On which occaſions, when they find their powers begin to fail, and their torpid ſtate to advance by the gradual approach of the winter's cold, they, from inſtinct, crawl into holes in the earth, cervices of rocks, hollow trees, or coil themſelves up under dried leaves, by which they are ſheltered from the ſeverity of the froſt. But, even in this weak ſtate, when their powers are greatly diminiſhed, they generate in themſelves a quantity of heat, which although ſmall, yet being conſtant, appears to be ſufficient for arreſting, as it were, the

principle

principle of life, and counteracting the effects of the external cold, until the returning warmth of the ſpring gradually removes their torpidity, and increaſes their vital and animal powers. This is, no doubt, the effect of the ſlow application of cold to the bodies of all animals ſubjected to torpidity in the winter. But, when a ſevere cold is ſuddenly applied, as in the above experiments, the great force of the ſtimulus on the ſyſtem excites, for ſome time, the moſt violent agitations, which increaſe the internal heat of all animals; for, ſuch as paſſively ſubmit to the cold are ſooner frozen than thoſe who ſtruggle againſt its action with a ſteady and vehement action of their bodies. But, at laſt, when much weakened by the continued exertion of their powers, their motions become more and more languid, the internal generation of heat leſſens with the diminution of their ſtrength, and the quantity of heat conducted from them being ſtill conſiderable, and in proportion to the cold of the freezing mixture and the

remaining

remaining heat in their bodies, that genial warmth, which muſt always accompany the exertions of the principle of life, continuing to decreaſe, both are in the end completely exhauſted. This, I imagine, is nearly the truth with regard to the operation of cold on animal bodies, which is farther illuſtrated by what I formerly remarked concerning the powers of the living body in reſiſting the effects of heat. But I am far from ſuppoſing that the ſubject is exhauſted; for, the laws of the animal oeconomy being ſo little known, it is highly probable, that the firm and ſteady retention of life, in animals expoſed to intenſe cold, may partly be owing to ſome other cauſe with which we are ſtill unacquainted.

97. With regard to the operation of cold on the more perfect animals, and eſpecially on the human ſpecies, all of them have the power of reſiſting, to a certain degree, the effects of cold. When the human body is

acted

acted upon by any air cooled several degrees below the freezing point, it still preserves its temperature. In this, it is assisted by a diminished perspiration, which increases the internal heat, and by the stimulating property of the cold when accompanied with exercise. However, when a person is long exposed, without motion, to such a degree of cold, the natural warmth of the extremities of the nose, the ears, &c. will be diminished, and the powers of life and action in them keeping pace with this diminution, the cold, at last, arrives at that point which must terminate in the extinction of life in those parts. But, as the great source of life, sensation, and motion, originates from the brain, cerebellum, and spinal marrow, the complete death of the body will not happen until these are likewise cooled below the natural standard. Or, what I rather suppose must take place on such occasions, as the natural warmth of the extremities and other parts decreases, the great principle of life, inherent in the brain, cerebellum, and

ſpinal marrow, will be proportionably weakened, and this diminution of ſtrength will go on nearly in a reciprocal ratio of the extent of the body ſo cooled, (parag. 18. and 19.) until the principle of life is totally aboliſhed. This probably happens before the brain, cerebellum, and ſpinal marrow, are cooled much below their natural temperature. After which, the body having loſt, with the vital principle, all power of reſiſting the effects of cold, it will as ſoon as any other dead matter of equal warmth, bulk, and ſolidity, aſſume the temperature of the circumambient air.

98. It may be farther remarked, that when the body of an animal, or a part of it, is cooled conſiderably below its ſtandard heat, at that inſtant a gradual decline of the powers of the principle of life commences, and proceeds till they are totally extinguiſhed. But, if we ſeize the opportunity before the complete death of the body, or any of its parts, and at a time when the living principle

principle is ſtill capable of being ſtimulated into action, we may, by the gradual and ſlow reſtoration of its natural heat, recover the parts, apparently dead, to their former healthy condition. In ſuch caſes, the powers of life and the heat of the body ſeem to keep pace with each other. The former may be ſlowly recovered by a gradual admiſſion of heat. But, if this balance be ſuddenly deſtroyed by an indiſcreet application of a diſproportionable quantity of heat, the living principle will be ſo ſtrongly excited into action, as to exhauſt its powers, and may occaſion death before that myſterious operation in the oeconomy can take place, by which it increaſes in quantity and in power, as happens when the heat thrown in is more exactly proportioned to the diminiſhed powers of the living principle. It is alſo evident, from the ſame facts, that a certain degree of heat not only cheriſhes and ſupports the powers of the living principle, but is likewiſe a chief cauſe

of

of that union which ſubſiſts between it and the body.

99. From the preceding paragraphs will appear the neceſſity of regulating the heat of the body, in the cure of certain diſeaſes, to that ſtandard eſtabliſhed by nature, and which ſo invariably accompanies a ſtate of health, by ſuch means as may beſt ſuit the degree of ſtrength poſſeſſed by the living principle. In feeble ſtates of the body, a certain balance muſt be kept up between the ſtrength of the actions of life, and the languid condition of the living principle; for, if theſe vital motions are, on ſuch occaſions, excited with violence by ſtrong ſtimuli ſuddenly applied, this balance is deſtroyed, the powers of life are exhauſted by theſe vehement motions, and death enſues. But, if the actions of the lungs, heart, &c. are brought on ſlowly, and by ſuch gentle means as beſt correſpond with the low ſtate of the living principle, they will, in certain caſes, gradually gather ſtrength,

ſtrength, until vigour is reſtored to the ſyſtem.

100. Notwithſtanding what has been ſaid concerning this heat, which nature ſeems ſo ſtrongly inclined to regulate with preciſion, yet we find, that the African, from habit, can bear with eaſe, nay even with indulgence, ſuch a degree of heat as the Greenlander would be ready to ſink under: But the Greenlander, from the ſame cauſe, can endure, without the ſmalleſt inconvenience, ſuch intenſe cold as would chill and benumb the inhabitant of the torrid zone, ſo as to endanger his exiſtence. Indeed, people who move from their native ſoil to diſtant climates, are more liable to the diſagreeable effects of the exceſs of heat and of cold, and to the diſeaſes that reſult from them, than the natives. On ſuch occaſions, the exerciſe given to the living principle, in maintaining the ſtandard point of heat, is always attended with an uneaſy ſenſation in the body,

dy, and a ſtrong deſire to remove it as far as in our power. It is generally obſerved, that, when either of theſe two ſtimuli act remarkably on our ſyſtem during the night, our reſt is diſturbed: For every one knows, that, if a perſon in winter goes to bed with his legs and feet cooled but a few degrees below the animal heat, he cannot poſſibly get into a ſound ſleep, until, from the confinement of the heat of his body by the bed-clothes, his natural warmth returns. And if, in ſummer, or at any other time, whilſt we are in bed, ſuch a degree of heat ſhall ariſe in our body, as excites the powers of life in any remarkable manner to reſiſt its effects, it then, for the moſt part, proves ſuch a diſagreeable ſtimulus as to deprive us of reſt, until, by expoſing part of our body to the air, or getting out of bed, this accumulation of heat is taken off*.

101.

* On the 26th June 1782, I was called out, at one o'clock in the morning, to viſit a gentleman's child a-

bout

101. In warm climates, we endeavour, by cool air, cool drink, acid fruits, and a variety of contrivances, to reduce the temperature of the air, or of our bodies, such as light thin dresses of linen, cotton, and silk, open and opposite windows and doors, jalousees, piazzas, &c. In such situations, violent exercise and high living are dangerous and hurtful to the constitution. In the cold and frozen regions of the north, we are prompted and even necessitated, for the same end of regulating our internal heat,

bout seven weeks old, supposed to be dying of a spasmodic asthma; but, knowing that the thermometer stood at 76°, and observing the child's night-dress and situation to be a great deal too warm, I judged the heat alone to be the cause of his debilitated state, and of the considerable difficulty in breathing he then suffered. Nor was I wrong in my conjecture; for, by dressing the child in a lighter manner, and exposing him to a cooler air, with a sheet only as a covering when in bed, the wheezing, panting, and asthma gradually went off, and never returned. On such occasions, after the children had, in some degree, recovered from their debilitated state, I have found the washing them with cold water of great use in speedily restoring their powers.

heat, to have recourſe to warm dreſſes of woollen cloth and furs, to ſleep between feather beds, and the houſes in theſe regions are kept conſtantly warm by fires or flues. A more free uſe of animal diet and ſtrong liquors is indulged in with impunity; and exerciſes in the field and otherwiſe are not only uſeful but neceſſary for all ranks of people. But if, in both caſes, the principle of life is under the neceſſity of exerting its powers in ſupport of this law in the ſyſtem, by which a fixed uniform point of heat is endeavoured to be kept up in it, then we muſt conclude that climate to be beſt ſuited, not only for the preſervation of health, but for raiſing and ſupporting the mental faculties in the utmoſt extent of their powers, where the quantity of heat generated, and that of its conſumption, ſhall, by a certain temperature of the air, be ſo balanced as to give the leaſt exerciſe to the living principle in reſiſting the increaſe or diminution of heat, to which

there

there muſt be a tendency in warmer or colder ſituations.

102. This fact is illuſtrated in the moſt ſatisfactory manner, by the learned and ingenious Dr Robertſon, in his excellent hiſtory of America, where, in taking a view of the effects of climate on the human body, he, with his uſual judgment and ſagacity, obſerves, 'In contemplating the inhabitants of a country ſo widely extended as America, great attention ſhould be paid to the diverſity of climates under which they are placed. The provinces of America are of ſuch different temperament, that this alone is ſufficient to conſtitute a diſtinction between their inhabitants. In every part of the earth where man exiſts, the power of climate operates with deciſive influence upon his condition and character. In thoſe countries which approach near to the extremes of heat or cold, this influence is ſo conſpicuous as to ſtrike every eye. Whether we conſider

'man merely as an animal, or as a being 'endowed with rational powers, which fit 'him for activity and ſpeculation, we ſhall 'find that he has uniformly attained the 'greateſt perfection, of which his nature is 'capable, in the temperate regions of the 'globe. There his conſtitution is moſt vi-'gorous, his organs moſt acute, and his 'form moſt beautiful. There, too, he poſ-'ſeſſes a ſuperior extent of capacity, great-'er fertility of imagination, more enterpri-'ſing courage, and a ſenſibility of heart 'which gives birth to paſſions not only ar-'dent but perſevering. In this favourite 'ſituation he has diſplayed the utmoſt ef-'fects of his genius, in literature, in poli-'cy, in commerce, war, and in all the arts 'which improve and embelliſh life.

'This powerful operation of climate is 'felt moſt ſenſibly by rude nations, and 'produces greater effects than in ſocieties 'more highly poliſhed. The talents of 'civilized men are continually exerted in 'rendering their condition more comfort-'able;

'able; and, by their ingenuity and inven-
'tions, they can in a great measure supply
'the defects, and guard against the incon-
'venience, of any climate. But the im-
'provident savage is affected by every cir-
'cumstance peculiar to his situation. He
'takes no precaution either to mitigate or
'improve it. Like a plant, or an animal,
'he is formed by the climate under which
'he is placed, and feels the full force of
'its influence *.' In the succeeding pages, this elegant writer goes on to remark, that although moral and political causes, with certain habits and customs derived from them, have wonderful effects in forming the dispositions and characters of individuals, as well as of nations; yet that the influence of climate is more universal on the inhabitants of rude nations, unacquainted or unpractised in the arts of obviating its effects, which, in many situations, may be in a great measure effected. He divides

* Vol. 1. p. 414.

divides the natives of America into two diſtinct claſſes; the one inhabits the temperate, the other the torrid zones, on both ſides of the line. He ſays, that the human ſpecies in the former appears manifeſtly more perfect: That the natives are more robuſt, more intelligent, more active, and more courageous. They poſſeſs, in the moſt eminent degree, that force of mind and love of independence, which are regarded as the chief virtues of man in his ſavage ſtate. Theſe natives accordingly, though ſurrounded for ſeveral centuries paſt by poliſhed and hoſtile nations, have hitherto maintained in a great degree their freedom and independence: But the other claſs, from the debility of their mind and body, their inactivity, want of courage, and of that independence which characteriſes thoſe living in the more temperate climates, have become ſo dependent as to be in ſome meaſure in a ſtate of ſlavery to thoſe nations, who, for the ſake of mines and commerce,

merce, have taken poſſeſſion of their territories.

103. In this ſection we have hitherto been contemplating that wonderful law in our ſyſtem by which a certain degree of heat is, at all times and ſeaſons, endeavoured to be maintained in the body. On this equality of heat, the free exerciſe of the powers of action in every part, and to the utmoſt extent in which they are capable of being exerted, ſeem chiefly to depend. We have alſo obſerved, that, in the various viciſſitudes of ſituation, with regard to the operation of heat or of cold upon the body, this conſtant and uniform regulation of the animal heat is carried on by the powers of the principle of life. That the expence of this vital principle in exciting ſuch actions as may beſt counteract the effects of heat or of cold on the body, muſt always correſpond with their exceſs, their time of application, and the habit of the perſon to a particular temperature. But, in all caſes where

where the exact balance between the generation and consumption of heat is not carried on, there must be a proportionable debility brought on the system, from the waste of our powers in support of the above regulation, which may have other effects on the health of the person than those mentioned in this section. For debility is always attended with such a proportional increased irritability as induced the learned M. de Haller to consider these words as synonimous, unless the debility arises from a paralytic affection; and we may reasonably suppose other alterations to take place in the oeconomy, from a penury of the powers of action, which must vary in different people, according as they may be exposed, for any considerable time, to an excess of heat or of cold. From this last circumstance, they must be subjected to such complaints as are the consequence of a diminished perspiration and languid circulation in the extreme vessels, which conditions in the body being conjoined to our

living

living on putrid or ſalt proviſions, and breathing a foul and confined air, I conſider as the moſt active cauſes in the production of the true ſcurvy.

104. On the other hand, when debility ariſes from the long application of an exceſs of heat, as happens to Europeans for ſome time after their arrival in any of the countries between the tropics, or until nature has, by degrees, accommodated herſelf to the heat of the climate, ſuch changes muſt take place in the ſyſtem as will expoſe the perſon to thoſe diſeaſes which are known to ariſe from an exceſs of heat and an accelerated circulation. Theſe have an evident tendency to relax the ſolids, to produce a redundant quantity of bile, and to increaſe the putreſcency of our fluids, with ſuch other alterations in the ſyſtem as are capable of producing bilious and other fevers, as ſhall afterwards be more particularly obſerved.

SECTION

SECTION IV.

OF FEVERS IN GENERAL.

105. AS fevers, and their conſequences, conſtitute by much the greateſt part of the diſeaſes of mankind, every attempt towards a farther inveſtigation of the nature and cauſe of them, when proſecuted with any degree of ſucceſs, muſt be of the utmoſt importance. This ſubject has employed the pens of ſo many ingenious and learned men, from the age of Hippocrates to the preſent time, that, to offer any thing farther on this head may have the appearance of a diſapprobation of their theories and doctrines concerning the cauſe of fever. This charge is the greateſt difficulty I have to encounter. On which account I ſhall proceed

proceed with the utmoſt caution on this ſubject, which is ſo much involved in obſcurity. For phyſicians have not given that attention to the internal oeconomy of our ſyſtem which the importance of the ſubject required. Hence our progreſs in this branch of knowledge, ſo neceſſary for comprehending the operation of the cauſes of diſeaſes on the body, has by no means kept pace with the other improvements in medicine. We remain, at this day, in great ignorance of the animal oeconomy, partly owing to the difficulty of the ſubject, but chiefly to thoſe ingenious hypotheſes and ſubtile theories of authors, which are ſo apt to pleaſe and bewilder the imagination. If we would add any thing to the little we know of this intereſting ſubject, it muſt be by a faithful record of facts and obſervations. This, fortunately for the preſent publication, does not require ſo much genius as accuracy and candour in the relation of facts. Conſcious of my inability to diſcuſs theſe particulars as the importance

of them demand, I have, upon the whole, abridged my reflections, and omitted ſome facts of a doubtful nature, until farther experiments and obſervations ſhall confirm their exiſtence in the oeconomy. But to compenſate, in ſome meaſure, this penury of principles, the hiſtory of the diſeaſes themſelves, and of ſome particular caſes, may ſerve as ſo many experiments towards an inveſtigation of the real nature and cauſe of them. In this way we hope for ſome ſucceſs in our attempt to explain the general cauſes of fevers, which may be comprehended under the following heads: 1. Exceſs of cold. 2. Exceſs of heat. 3. Marſh miaſma. This laſt is often conjoined with the two former, but more eſpecially with exceſs of heat, in the production of fevers. 4. Human contagion. 5. Specific contagion. The three laſt have their virulence heightened in proportion to the degree of heat and moiſture which have accompanied their production, or ſubſiſted during their action on the body.

106.

106. The remote or predisponing, and the occasional causes of fevers, have been amply treated of by almost every author who has written on fevers, and by several of them in a most satisfactory manner. But, with regard to the proximate cause, or the nature of that particular stimulus, by which the accession of a fever is brought on, these authors have not been so explicit. Many who have eminently distinguished themselves, as well for their extensive practice, as for their genius and learning, have spoken of an explanation of the proximate cause of fever as a thing rather to be wished for than expected from the present state of our knowledge with respect to the internal oeconomy of the system. The late Sir John Pringle, whose abilities as a philosopher and physician gained him considerable reputation, when treating of this subject in his observations on the diseases of the army, says, 'Thus far we have endeavoured to trace the remote, the predisponing, and the occasional causes of

'these

'theſe fevers, and it were to be wiſhed, that, 'with the ſame probability, we could ex- 'plain the *cauſa proxima*, or immediate 'cauſe, that is, could ſhow how theſe viti- 'ated humours act upon the vital principle, 'ſo as to excite a fever of a remitting or 'intermitting form, accompanied with ſuch 'ſymptoms as mentioned above. But, in 'theſe reſearches, as ſo much depends on 'the action of parts which have laws pe- 'culiar to themſelves, and are imperfectly 'known, it ſeems better not to form an hy- 'potheſes at preſent, but to wait till far- 'ther diſcoveries be made in the animal 'oeconomy *.' It is, no doubt, by a more particular intimacy with theſe laws, or, at leaſt, with as many of them as can, from faithful obſervations, be made evident, that we can ever expect to arrive at any real improvement in the knowledge of our internal oeconomy, and of the manner in which the cauſes of diſeaſes act on the ſyſtem.

* Quarto edit. London, 1765, pag. 186.

ſtem. This is the plan which I ſhall endeavour to proſecute, and what I wiſh to recommend in the ſtrongeſt manner to thoſe who may have more abilities and time for ſuch inquiries.

107. Many are the ingenious theories which have been ſucceſſively publiſhed, from the moſt early ages of phyſic, to this day, relative to the proximate cauſe of fever. Each of them has had its votaries, who have ſupported its credit for ſome time, but has, at laſt, been obliged to give way to others more novel and more ſuited to the prevailing doctrine, or the ſtate of medicine. This has been uniformly the fate of almoſt every hypotheſis explanatory of this point in ancient or modern authors, principally from the neglect of a regular inquiry into the nature and properties of the living principle, of the power of the nerves in conducting it, and of various ſympathies ariſing in the body, from the application of different ſtimuli, eſpecially

to

to the ſkin, ſtomach, and bowels, where their operation, in many caſes, is ſo gradual and ſo ſlow as not to be eaſily perceived until ſome conſiderable change is brought on the ſyſtem. This is, perhaps, the method which ought to have been adopted for obtaining a regular progreſſive improvement in the knowledge of diſeaſes and their cauſes. But the philoſophy of the ancients was ſo exceedingly limited with regard to the animal oeconomy, that they had not data ſufficient for the proſecution of ſuch a plan. And the moderns, notwithſtanding their ſuperior advantages, have, in general, either neglected it altogether, or proceeded ſo feebly as to afford us very little benefit from their labours. It is true, ſince the time of Doctors Stahl and Hoffman, the ſtudy of the human body as an animated machine, has been more cultivated than formerly, and, of courſe, the effects of the paſſions and affections of the mind on the body, and of various ſtimuli applied to its nerves, are now better

under-

underſtood. But, notwithſtanding this favourable turn to our medical philoſophy, we have not made ſuch advances as might have been expected. It is an evident defect in this ſpecies of knowledge which leads the practical phyſician unavoidably into empyriciſm*. For, in many inſtances, not

* Here I muſt not be underſtood to annex any diſreſpectful idea to the word *empyric*, notwithſtanding a number of low, illiterate, and, I may ſay, dangerous men, who vend their noſtrums to patients they never ſee, and for diſeaſes they know nothing of, have acquired that name. It is only the ingenious and learned men of experience and obſervation whom I mean to honour with that appellation, from whom the practice of phyſic, in the cure of diſeaſes, has received much more improvement than has been afforded us by the dogmatic ſect. As the dogmatiſts had Hippocrates the father of phyſic for their founder, they were followed by the moſt reſpectable of the Grecian and Arabian phyſicians, from whom, till about the fifteenth, or, I may ſay, the ſixteenth century, was learnt all that was known relative to the ſtructure of the human body, the animal oeconomy, the nature of diſeaſes, their remote and proximate cauſes, the qualities of ſimple and compound

not being able to discover the true cause of the disease, he is obliged to be directed by his experience to such remedies and applications as he has found to be successful in the

compound medicines, and the manner of their application in the cure of morbid states of the body; but with very little improvement from the time of their founder or his commentator Galen. During which period of about two thousand years, there were a set of men not altogether ignorant of the doctrine of the ancient physicians, but who applied themselves more particularly in searching after remedies for the cure of diseases, without troubling themselves much as to the nature and causes of them, and with such success as gained them sometimes reputation for the efficacy of their medicines. These being once established, they came to be adopted by the dogmatists themselves, in whose hands, I must own, they were employed with greater advantage. But, at the head of our modern empyrics, we must certainly place Paracelsus, whose history being well known, I shall only mention his thorough contempt of Hippocrates, Galen, and their followers; his introducing into practice chemical preparations, without paying much regard to the original causes of disorders, it being a saying with such men, *non interesse quid*

the reſtoration of health in ſimilar caſes, uſing ſometimes medicines whoſe operation on the ſyſtem are exceedingly obſcure, and not knowing by what properties they

 contribute

quid morbum faciat, ſed quid tollat, in oppoſition to the maxim of the dogmatiſts, *Cognitio cauſae morbum tollet.*

The medical profeſſors in univerſities, and moſt other practical phyſicians, pretend to be dogmatics, or wiſh to be thought ſo; but, from what I have been able to obſerve in their writings, and from repeated converſations with many learned men amongſt them, they appear to me, in practice, to belong more to the empyric than the other ſect. Nor can it well be otherwiſe; for, in ſuch diſeaſes, whoſe cauſes cannot be diſtinctly traced, or whoſe operation on the ſyſtem is but obſcurely underſtood, they are often obliged to preſcribe rather according to the ſymptoms than to the original cauſe of the diſorder, or, in their uncertainty as to the preciſe nature of the diſeaſe, to order ſuch means of recovery as they have from experience found to be ſucceſsful in ſimilar caſes.

From this ſhort view of the practice of phyſicians in general, it muſt be next to impoſſible for even the moſt eminent in their profeſſion, ſtrictly to maintain the character of a dogmatiſt. For, notwithſtanding their education

contribute to the cure, they are dignified with the appellation of ſpecific, a word we are ſuppoſed ſometimes to uſe to conceal our ignorance, with reſpect to the qualities of ſome remedies, as we have been at other times accuſed of ſhielding ourſelves under the word *nervous*, when we are ignorant of the nature of the diſorder. I could wiſh, no doubt, to have it in my power to wipe off this odium thrown on our profeſſion, but

education and ſtudies being carried on according to the regular plan of that ſect, as the only method by which they can acquire thoſe principles in phyſic capable of directing them to the moſt ſucceſsful treatment of their patients; yet, there are many inſtances in which, not only from the obſcure nature of the diſeaſe, but ſometimes their ignorance of the preciſe operation of the medicine given in the cure of it, they are under the neceſſity of proceeding on the empyrical practice. This, on account of their ſuperior knowledge of the animal body, and diſeaſes in general, will always be conducted with greater ſafety and ſucceſs than by the mere empyric, who endeavours to compenſate for his ignorance in theſe reſpects, by a boldneſs in his practice which is frequently attended with danger.

but ſhould be ſtill more ſolicitous, for the benefit of mankind, to be able to explain ſome circumſtances relative to fevers, and their cure, which are at preſent involved in ſome obſcurity, and, particularly, with regard to their proximate cauſe.

108. If the hiſtory of fevers admitted of it, I would incline to give the firſt place to the moſt ſimple, than to thoſe leaſt complicated, and afterwards proceed to the conſideration of ſuch as are more complex, with regard to their cauſes. But we can go only a little way on this plan, unleſs we were to take in thoſe fevers which ariſe from ſpecific contagion, as the ſmall-pox, meaſles, chincough, &c. the conſideration of which I chooſe to reſerve for another part of this work. This way of denominating fevers as ſimple, complicated, or complex, is uncommon. But the propriety of it, after we have taken a farther view of their cauſes, will not, I imagine, be diſputed. Thus, a catarrh ariſing ſolely from an application of

of cold to the body, as ſhall be ſhown in Sect. V. is, perhaps, the moſt ſimple of all febrile diſeaſes. A catarrhal fever, which originates from the ſame cauſe, acting more powerfully on the ſyſtem, as will appear in Sect. VI. is a more formidable diſeaſe, but is of a ſimple nature with reſpect to the cauſe producing it. But the bilious fever, as will afterwards appear, is compounded of the catarrhal fever with the cholera, or, at leaſt, with that morbid ſecretion of bile, which will be ſhown in Sect. VII. to precede the attack of that diſeaſe, and to be the effect of the heat of the ſummer or of the climate. On which account, though the cholera is not, ſtrictly ſpeaking, a febrile diſorder, I propoſe to treat of it, previous to the coſideration of what is called the autumnal fevers, with which it is ſo intimately connected.

109. Another cauſe of fevers, and, perhaps, the moſt univerſal, is the marſh miaſma, which is capable of producing fevers

of

of various degrees of malignancy, according to its ſtrength, or accidental conjunction with other cauſes. Authors, for the moſt part, ſpeak doubtfully as to the preciſe nature of this miaſma. But, from its origin, and effects on our ſyſtem, there can remain little doubt as to this point. The greateſt quantity of it ariſes from fenny and marſhy grounds, more or leſs impregnated with putrid exhalations from an immenſe quantity of corrupting vegetable and animal ſubſtances. Its activity in producing fevers is heightened by all ſuch circumſtances as increaſe putrefaction, and promote the evaporation of it, as heat and moiſture. Of courſe, the moſt unhealthy ſituations muſt be in the neighbourhood of ſuch ſwamps, where the air is fraught with putrid vapours, and the warmer the ſummer or climate, the greater is the danger. When ſuch grounds are, at particular ſeaſons of the year, covered with water, this prevents the putrid miaſma from riſing in any conſiderable quantity, and, of courſe,

the

the diſeaſes are fewer and leſs violent. But when, from the great evaporation occaſioned by a hot ſummer, the ground is uncovered, leaving it in a ſwampy ſtate, then aquatic plants, inſects, and reptiles dying and corrupting, produce vapours of a moſt malignant nature. Something ſimilar to this is obſerved in the Eaſt and Weſt Indies, and in Africa, where, as in other countries, the drieſt and beſt ventilated ſituations are the moſt healthy, and during thoſe months of the year when little or no rains fall, and they are refreſhed with gentle breezes from the ſea, nay, even in the rainy months, ſickneſs, in general, is not remarkable. But, ſoon after the rain ceaſes, a conſiderable evaporation takes place every where, but eſpecially in the low grounds, which become marſhy at that ſeaſon of the year, and bilious fevers of the remittent and intermittent kind, diarrhoeas and dyſenteries, are frequent, and often dangerous.

110.

110. Although authors appear univerſally to agree that marſh miaſma is the moſt general cauſe of fevers, and give the moſt undeniable proofs of its effects, yet we are not to conclude marſhes and fenny places to be the ſole ſources of this miaſma. In ſuch places, no doubt, it is in the greateſt quantity and moſt active. For, I am confident that more or leſs of it muſt ariſe from every place where there is heat and moiſture, though it cannot properly be denominated marſhy, this miaſma decreaſing in its power, in proportion to the diminution of the heat and moiſture to which the ground from whence it ariſes is expoſed. Hence we have little to apprehend from the putrid miaſma raiſed by the heat of the ſun, from what may be called the arable lands in this country, unleſs in ſeaſons remarkably hot and moiſt, becauſe it ſeldom has ſufficient power of itſelf to produce fevers, but acts in conjunction with other cauſes.

111.

111. The moſt active cauſe of fevers hitherto mentioned is human contagion, which is capable of producing fevers of the moſt dangerous kind, and always adds to the malignancy of other co-operating cauſes. In camps, human contagion ariſes chiefly from the privies. But it is found to have ſtill greater effects on our ſyſtem in crouded hoſpitals and jails, where it attains its higheſt degree of virulence, from the excrementitious effluvia of the ſick, and perſons dying of putrid diſtempers. It has been repeatedly obſerved, and is now known to be a fact, that this malignant vapour becomes more ſuddenly contagious and powerful in its effects, ſome time after it has been thrown off from the body, or from excrementitious matter accidentally collected in the apartments of the ſick, eſpecially when it is imbibed by blankets, or woollen or cotton cloths, which retain it for a conſiderable time in a moſt contagious ſtate. This ſeems to ariſe not only from an accumulation of it in the woollen, cotton, &c.

uſed

uſed by the ſick, but probably from its acquiring a greater degree of putrefaction by heat and moiſture; which laſt circumſtance often occurs from the bed-clothes being packed up for the waſh-houſe, but, from hurry, inattention, or ſome other accident, have been neglected to be ſent there *. Sir John Pringle gives a remarkable proof of the truth of this obſervation; for, of twenty-three journeymen taken ill of the hoſpital fever, from being employed by a tradeſman of Ghent in refitting ſome infected tents, only ſix recovered; which ſhows the high degree of peſtilential malignancy this infectious matter ſometimes acquires.

112. But, as we have remarked in parag. 110. that ſwamps and fenny grounds are not the only ſourſes of marſh miaſma, in like manner, we may here obſerve, that jails, hoſpitals, and ſhips crouded with men, are not the ſole places from which human

* Vid. Dr Lind's Eſſay on Fevers and Infection, London, 1763, p. 38.

contagion may derive its origin; for it is to be found in private families, eſpecially of the lower ſort, in populous towns and villages, where, from the particular ſituation of their houſes, there cannot be a free circulation of air. But it is eſpecially to be aſcribed to a total neglect of cleanlineſs in their perſons and houſes, which is ſo frequent an attendant of poverty. This obliges them to live in a foul and unwholeſome air, and notwithſtanding the power of habit, ſubjects them to fevers, particularly in the ſummer months. Hence the reaſon why ſuch people rear up ſo few children, in proportion to the number born, is obvious. A ſmaller quantity of the ſame unwholeſome human effluvia muſt exiſt in every large city and town, and, from this, moſt probably, ariſes the chief difference between the town and country air: For, although the former is not, in the generality of houſes, ſufficient of itſelf to prove the cauſes of diſeaſes, yet, when

they

they are brought about by other means, it always adds to their malignancy.

113. The marſh miaſma has been ſhown to be of a putrid nature, (parag. 109.) and the human contagion of jails and hoſpitals appear evidently to be ſo; but may alſo contain the ſpecific contagion of the diſeaſes with which the ſick were afflicted, and it is from this laſt circumſtance chiefly, that they differ from each other: For, when the marſh miaſma has acquired a degree of noxious power equal to the human contagion in jails and hoſpitals, the diſeaſes ariſing from it are nearly the ſame, as has been remarked by many medical practitioners of character and accurate obſervation. I know, from ſeveral converſations with the late Sir John Pringle, on the ſubject of fevers, that he was of this opinion; and I obſerve in his medical annotations in manuſcript, bequeathed to the Royal College of Phyſicians in Edinburgh, ſeveral obſervations confirming this fact. He particularly

larly mentions a converſation he had in June 1764, with Count Carburi in Academ. Tourin. Medicin. Primar. Profeſ. when in London, at which time Sir John having given to the Count a detail of our jail and hoſpital fevers, with their chief ſymptoms, Count Carburi told him, that they exactly correſponded with thoſe of the malignant fever in his country, and did not doubt, notwithſtanding his patients in the hoſpital breathed a tolerably good air, and though he had never ſeen any fevers in jails, that their malignant fevers might ariſe from ſome degree of putrefaction in the atmoſphere, in a climate ſo much warmer than ours*. And, in another place of the ſame Med. Annot. Sir John ſays, that, in Auguſt 1770, upon converſing with Dr Mackenzie, who lived eight years at Smyrna, and theſe laſt thirty at Conſtantinople, I found, 'that the common endemic peſtilential fever of Conſtantinople, is the ſame with 'our

* Vol. vii. p. 209.

'our jail or hoſpital fever, and they call the 'ſame diſtemper, when raiſed to a greater 'height, the plague, that is, when to the 'ordinary ſymptoms were joined bubos 'and carbuncles *.'

114. From this view of the nature and origin of marſh miaſma, and human contagion, it will appear, that, with the concurrence or abſence of particular circumſtances, tending to increaſe or diminiſh their noxious power, they muſt, in different times and places, exiſt with various degrees of ſtrength. Sometimes they are ſcarcely capable, without the conjunction of other cauſes, of producing fever. Whilſt, at other times, they may be of ſo noxious a nature, as to affect the moſt robuſt in a few minutes after they have been received, with the uſual ſymptoms of their malignant tendency. And we can frequently obſerve intermediate degrees of their malignity,

* Vol. viii. p. 72.

lignity, both with regard to the power of the noxious effluvia, and alſo to the force of the ſyſtem, from habit, to reſiſt their effects, (parag. 46. and 47.) For marſh miaſma is not, in all ſeaſons, poſſeſſed of the ſame degree of virulence; and it is not for ſome time after jails and hoſpitals have been crouded, that the contagious vapour attains its higheſt degree of malignancy; during which period, and afterwards, perſons in jail, and patients in the hoſpital, with the nurſes, and other attendants of the ſick, are taken ill, one after another, in proportion to the ſtrength of their ſyſtem to reſiſt the effects of the putrid contagion, whilſt ſeveral of them eſcape the fever for a conſiderable time, and ſome altogether, as if, from the habit of living in this foul air, it loſt, in ſome degree, that power of infection it appears to poſſeſs over ſtrangers, or thoſe newly admitted.

115. The manner in which contagion in general comes, at firſt, to affect our ſyſtem, has

has not yet been clearly aſcertained, though authors have mentioned four different ways by which the matter of infection may enter the body, and prove the cauſes of diſeaſes: 1*ſt*, By the pores of the ſkin: 2*dly*, By reſpiration: 3*dly*, By inoculation: And, 4*thly*, By the ſaliva ſwallowed and taken into the ſtomach.

116. As to the firſt, by the pores of the ſkin, I never could in my own, or from the practice of others, find ſufficient certainty of its taking place: For, in the very few inſtances that might be alledged in proof of this hypotheſis, they muſt, from the contact of a morbid with a ſound body, be referred to the head of inoculation, and not to that of a general abſorption of malignant vapours by the ſkin, which I hold to be extremely improbable. Nor is there, as far as I know, any direct evidence of it.

117. That of reſpiration is more plauſible, from an opinion that univerſally prevails,

vails, of contagious matter entering the circulation in this way, and proving the ſource of diſeaſes. But this is by no means made evident from obſervation, or the hiſtory of diſeaſes; for, if the abſorbents on the internal ſurface of the bronchi and veſicles of the lungs are an inlet to the cauſes of putrid or other diſeaſes, it is moſt ſurpriſing that this viſcus is not always affected in theſe diſorders, which it certainly is not. It is true, that the matter of infection may enter the trachea and its branches with the air inſpired; but it is immediately returned in reſpiration. Beſides, the conſtant emiſſion of moiſture from the internal ſurface of the veſicles of the bronchi, and the exhalation of this moiſture with the air in reſpiration, are moſt unfavourable circumſtances to the entry of infection by the lungs. In this way, nature appears to have provided againſt ſuch accidents, otherwiſe it would have been almoſt impoſſible for any perſon to breathe in an infected air without receiving the infection, the contrary

trary of which we experience every day in hoſpitals, and other apartments of the ſick. I know, that a morbid affection of the lungs may be brought on by a perſon lying in bed with another under a phthiſis pulmonalis, and that the ſame diſeaſe may terminate in open ſores in the lungs; but this muſt be conſidered more as a ſpecies of inoculation, than as a cauſe acting on the ſyſtem at large, and producing theſe effects. Neither can the topical inflammations of the lungs we ſometimes meet with in the courſe of diſeaſes, be accounted for in this way, becauſe they can, in general, be diſtinctly traced from other ſources, ſuch as cold, &c. Another circumſtance which throws great diſcredit on this opinion, is the exquiſite irritability of the internal membrane of the bronchi, and veſicles of the lungs, which cannot bear the application of any acrid ſubſtance, without giving evident ſigns of its functions being more or leſs diſturbed; and ſome particular vapours, as the fumes of burning charcoal, burning

brimſtone, mephitic air, &c. act ſo powerfully, as in a ſhort time to put a ſtop to reſpiration, and, of courſe, to the vital motions, which, if long continued, as has been obſerved in parag. 13. may end in death.

118. We have always had the cleareſt demonſtration of contagious diſeaſes being communicated by inoculation. In thoſe not accompanied with fever, as the venereal diſorder, the itch, and ſome other diſeaſes of the ſkin, it appears to be the general and uniform manner in which they are propagated from one to another. But, in the infectious fevers from marſh miaſma, human, or ſpecific contagion, though we know that moſt of them may be produced in this way, and that the univerſal practice of inoculation for the ſmall pox, and, in ſome few inſtances, for the meaſles, ſets this matter beyond the poſſibility of doubt, with reſpect to theſe diſeaſes; yet, it is equally certain, that this is by no means the manner in which theſe diſtempers are communicated

municated in what is called the natural way. For inoculation produces immediately a mere topical diſorder, which gradually increaſes, but does not, till after ſix, eight, or ten days, and ſometimes for a longer ſpace from the operation, affect the ſyſtem in general. Beſides theſe particular circumſtances attending this manner of producing the diſorder, the ſymptoms, on the acceſſion of the fever through the progreſs of the eruption and maturation of the puſtles, are milder; and, with reſpect to danger, it is next to none, when compared with the fatal conſequences of the diſtemper caught in the ordinary manner; at which time, the cauſe of the ſmall pox, and of the other fevers juſt mentioned, muſt act in ſome other way on our ſyſtem, which I ſhall preſently endeavour to illuſtrate, and, at the ſame time, take under conſideration ſuch circumſtances accompanying the inoculated and natural ſmall pox, and likewiſe thoſe fevers ariſing from marſh

marſh miaſma, or human contagion, as may tend to illuſtrate the ſubject.

119. The fourth manner in which the cauſes of certain malignant fevers, ariſing from marſh miaſma, human, or ſpecific contagion, are ſuppoſed to get into our habit, is by the noxious effluvia taken in with the air in reſpiration, mixing with the ſaliva, and, by deglutition, conveyed into the ſtomach, where, by certain changes brought on the gaſtric fluids, and their particular ſtimulus on the nerves of the ſtomach and bowels, they prove the cauſe of fevers, differing from one another, according to the nature of the infectious exhalation. This I have always thought to be the moſt probable way that infections are received by us, and of their acting on our ſyſtem in the production of fevers.

120. As I am of opinion that all putrid ſubſtances and ſpecific contagion are capable of acting as a ferment on the ſaliva and contents of the primae viae, I have, in the preceding

preceding paragraph, mentioned certain morbid changes brought on the gaſtric fluids after the infectious matter has been ſwallowed, and, previous to the acceſſion of the fever. This change, I ſuſpect, takes place previous to the acceſſion of thoſe fevers called nervous, putrid, or malignant, but eſpecially in the fevers known to ariſe from ſpecific contagion, as the chincough, meaſles, and ſmall pox. And, when we take a view of the general appearance of the ſmall pox caught in this way, and compare its malignancy, and often fatal conſequences, with the mild ſort of the ſame diſorder given by inoculation, which is ſo ſeldom attended with danger, we are naturally led to inquire into the cauſe of this difference between them, which, if our premiſes are juſt, I humbly apprehend, will admit of ſome explanation. But, before we can enter on this ſubject, it will be neceſſary, not only to conſider the progreſs of inoculation, but alſo ſuch circumſtances as attend both the inoculated and the natural ſmall pox, as are known to

alleviate

alleviate the diſeaſe, or increaſe its malignancy.

121. When we inoculate, the minuteſt quantity of the variolous matter lodged in the ſkin by the point of a lancet or needle, gradually increaſes in quantity from its infecting the fluids extravaſated by the puncture, or ſecreted in the neighbourhood of it, and afterwards the infection is carried on to ſome diſtance beyond the puncture. All which time the patient is very little affected, complaining only of ſome degree of heat and itchineſs in the part. The infection appears to ſpread from its acting as a ferment *. But the ſyſtem, in general, is

* Sir John Pringle was informed by Mr Sutton, that, when a perſon is inoculated for the ſmall pox, who never had the diſtemper before, and has received the infection, if, the day after the inoculation, the point of a needle, pin, or lancet, be put into the puncture made for the inoculation, ſuch needle, pin, or lancet, will be capable of giving the ſmall pox to another who has not formerly had the diſeaſe. This is a clear proof that the variolous matter acts as a ferment, that there is a local

is not apparently affected by it, until the matter has ſo increaſed in quantity, and, perhaps, in its activity, as to appear fluid under the cuticle, when it has probably attained its higheſt degree of infectious power, at which time there is an abſorption of it, and, upon getting into the circulation, it communicates the infection to the general maſs of fluids. This abſorption is evident from the patient complaining, ſome time before the acceſſion of the fever, of pain and ſome degree of ſwelling in the lymphatic glands of the axilla, when the inoculation has been performed in the arm. This ſymptom is not uniformly a conſequence of the abſorption of the variolous matter. But, when it does happen, it ſhows diſtinctly that the abſorption has taken place.

122.

local generation of the ſmall pox matter, and that the diſeaſe is topical for ſome time; *Med. Annot. vol.* viii. *p.* 548.

122. There are ſome circumſtances attending the acceſſion and progreſs of the ſmall pox which merit attention, becauſe the violence and danger of this diſeaſe appear to keep pace with the power in which they exiſt; and, firſt, of the effects of the topical application of the variolous matter in the part to which it was firſt applied, and from whence the diſorder derives its origin. This is a circumſtance not ſufficiently attended to. But, I am perſuaded, it is of the utmoſt conſequence with regard to the future magnitude of the diſeaſe; for the whole ſyſtem, as in ſimilar caſes, muſt be more or leſs diſordered by ſympathy from the part firſt affected, which never can be ſo conſiderable from any external part of the body after inoculation, as when it proceeds from the ſtomach and bowels, where ſtimuli of every kind affect the ſyſtem in general more powerfully than when applied to any other part of the body. The fever which precedes the eruption, and continues through the courſe of the diſorder,

diſorder, and its conſequences, heat, thirſt, debility, reſtleſſneſs, &c. depending, in a great meaſure, though not altogether, on the degree of this febrile ſtimulus; for, I ſuſpect, that, from the commencement of the action of the variolous matter on our fluids as a ferment, there is a tendency to fever from a general acrimony introduced into the blood, which gradually increaſes with the generation of the ſmall pox matter, but is, in ſome degree, abated on its being thrown out of the circulation on the ſurface of the body, where it riſes in puſtules under the cuticle.

123. It is not improbable, that the variolous ferment, acting on the gaſtric fluids previous to the acceſſion of the fever, and for ſome time afterwards, may be another reaſon why the diſeaſe runs on to a greater height and danger when it is caught in this way, than when given by inoculation, the ſpecific contagion being carried into the circulation from the primae viae, where

it has acted as a ferment, in greater quantity than from two or three variolous puſtules on the ſurface of the ſkin.

124. Every practitioner knows, that, when perſons are ſeized with the ſmall pox, either in the natural way or by inoculation, ſome have few or no puſtules, and the diſorder goes off without creating much diſturbance in the ſyſtem, whilſt others have an immenſe load of a malignant ſort: But this difference does not appear to ariſe from any particular acrimony in the blood previous to the infection, or to any peculiarity of conſtitution with which we are acquainted; for ſcrophulous children, and others with tettery ſores and blotches on their ſkin, or in ſome other way weakly and delicate, have ſometimes a very mild ſmall-pox: We every day ſee others, apparently in good health, and with an excellent conſtitution, die in conſequence of the malignancy of the diſeaſe. This difference may perhaps ariſe from ſome peculiarity

culiarity in their ſyſtem, which ſubjects them to be affected in a much ſtronger manner than others by the particular ſtimulus of the ſmall-pox matter: It may originate from a greater or leſs propenſity in the blood itſelf to be affected with this particular ferment; from the degree of infectious power the ſmall-pox matter may poſſeſs; or from a greater or leſs degree of ſtrength in the digeſtive powers: For, when the matter of infection is of a mild ſort, and the digeſtive powers are conſiderable, the nature of it may be ſo altered by thoſe powers, as to prevent the ordinary effects of the infection on the body, which might take place in weaker conditions of the ſtomach and bowels. From this obſervation will appear a probable reaſon, why the cauſes of diſeaſes do not operate uniformly on all perſons; and why ſome eſcape the infection of certain diſeaſes at one time, and are caught with it at another period, when the primae viae and ſyſtem are leſs capable of reſiſting its force. Hence

the

the quantity of variolous matter, generated in the courſe of the diſeaſe, may be various in different perſons; or all the above circumſtances may have their ſeparate ſhare in producing that variety of malignancy we every day meet with in this diſtemper.

125. The quantity of the ſmall-pox matter generated chiefly at the commencement, and partly through the courſe of the diſeaſe, depends more on the degree of heat in which the patient is kept, on the acceſſion of the fever and afterwards, than on any other circumſtance with which we are acquainted. This gives the inoculated patients a greater advantage over thoſe who are caught with the diſtemper in the natural way. In the one caſe, the patient being appriſed of the nature of the approaching diſorder, is put under a proper regulation of diet, and, when attacked with the fever, he is directed to keep as much out of bed as poſſible, to get ſometimes into the open air, to drink cold water, or

ſubacid

ſubacid cold drink, and in general to keep himſelf cool, which is known to depreſs the fever and mitigate the ſeverity of the ſymptoms. But, in the ordinary way of receiving the infection, the perſon, on the attack of the ſmall-pox fever, not knowing the nature of it, and rather ſuſpecting it to ariſe from cold, or ſome other cauſe, he takes to his bed, which he is in ſome meaſure neceſſitated to do, on account of the violence of the ordinary ſymptoms, and a conſiderable proſtration of ſtrength, when, from a large fire in the room, an addition of bed-clothes, and warm drink, with a view to bring on a ſweat, all the ſymptoms are aggravated, the fever is increaſed, and the heat of the body becomes at laſt inſupportable, which greatly augments the power of the variolous matter as a ferment, and of courſe both quickens and increaſes the generation of it in our circulating fluids; and this is commonly attended with a proportionable degree of virulence in the matter generated. From theſe circumſtances

ces the danger and fatality of this dreadful diſtemper originate, and they ought to admoniſh us in all fevers, and eſpecially thoſe of a putrid tendency, to keep the body as cool as poſſible: For, beſides theſe effects of an exceſs of heat, it is always attended with a debility correſponding to the degree of heat kept up above the ſtandard in a healthy ſtate *.

126.

* About the end of May 1751, when in the 4th regiment, then quartered at Glaſgow, where the ſmall-pox was at that time a frequent and fatal diſtemper, five companies of that regiment were ordered to march to Lanark, where in a few days the ſervice being performed for which they were ſent, they began their march for Strathphillen in the Highlands, to work on the military roads. Soon after we left Glaſgow, twelve or fourteen of the ſoldiers children were ſeized with the ſmall-pox fever. The weather turning out remarkably cold, with a conſtant rain during our march, and the children being carried on horſeback in open panniers, with little more than a ſingle blanket to defend them from the cold and rain, I was under ſome apprehenſion of bad conſequences from a ſituation ſo much expoſed,

126. Having thus, in a curſory manner, mentioned ſuch circumſtances, relative to the

expoſed; notwithſtanding I had for ſome years received the moſt ſalutary proofs of the advantage of patients being kept remarkably cool in this diſorder. But my fears on that occaſion were ill founded; for the whole of the children had a mild and diſtinct ſort, more like the inoculated than natural ſmall-pox; and they ſoon recovered. From this period I took every opportunity of promulgating amongſt my medical acquaintance not only this piece of intelligence, but alſo a number of other inſtances which occurred afterwards, and ſhowed, in the cleareſt manner, the beneficial effects of keeping perſons under the ſmall-pox as cool as poſſible. In particular, I had ſome converſations with my learned and ingenious friends the late Sir John Pringle of London, and Doctors Whytt and Stevenſon of Edinburgh, all of whom were perfectly ſatisfied of the utility of this practice, which was confirmed by their own experience. But the timidity and caution of the dogmatiſt, by which is commonly underſtood the regular bred phyſician, was ill ſuited to the introduction of a general practice. The boldneſs and intrepidity of an empyric was neceſſary, whoſe addreſs with the public, from poſitive aſſurances of ſucceſs, is better calculated to gain their favour, than the qualified probabilities of the dogmatiſt.

Theſe

the inoculated and natural ſmall-pox, as, I imagine, not only tend to explain the nature of this diſorder, but likewiſe to throw ſome additional probability on the ſuppoſition of this and other infectious and malignant fevers being commonly caught by ſwallowing the noxious miaſma, from which they take their origin, with the ſaliva, I ought not to omit that oppreſſion, which is generally felt on the acceſſion of theſe fevers, about the praecordia, great ſickneſs,

Theſe qualifications we fortunately met with in Mr Sutton, to whom the world in general lies under many obligations; notwithſtanding ſome of his followers in this country have perhaps carried this practice to an extreme. For, although we may go great lengths in cooling the body, when the fever is high and the eruption conſiderable, yet in children, where the fever is moderate and the puſtules are few, there is not the leaſt neceſſity of expoſing them naked at open windows to froſt and ſnow; becauſe, with a certain degree of chillneſs, the powers of the ſyſtem are weakened, and the body becomes more irritable, which I have often ſuppoſed to be the cauſe of thoſe convulſions with which children are ſometimes ſeized when in ſuch a ſituation.

ſickneſs, often a vomiting of phlegm and bilious matter, with an alleviation of ſymptoms, ſometimes a diarrhœa, ſevere headach, pain in the loins, and a general debility of body and mind. I know theſe ſymptoms are ſuppoſed to ariſe from ſympathy with the ſyſtem, in ſome other way acted on by the cauſe of the diſeaſe, though the preciſe manner in which this is ſuppoſed to be done is by no means diſtinctly pointed out by any one who has written on this ſubject. I am therefore rather inclined to become a convert to obſervation and facts, than to any theory, however ingenious; for I cannot comprehend how the ſyſtem comes to be affected by the action of the cauſe of the diſeaſe in the myſterious manner in which this is ſaid to take place, but can eaſily perceive how this may be affected from its action on the primae viae. I ſhall therefore proceed to give ſuch farther evidence of it, as I humbly apprehend will amount to as clear a proof

of its truth, as the nature of such a subject will admit.

127. This opinion, that the infectious effluvia of malignant fevers mixes with the saliva, and afterwards gets into the stomach, has been embraced by several physicians of character. Dr Turner, physician to the military hospitals in the West Indies, in a letter to Sir John Pringle, says, 'That he e-'scaped the infection of the hospital fever 'by chewing tobacco during the time he 'was on his visits to the men in the hospi-'tal, imagining that all putrid and conta-'gious effluvia entered and infected by the 'saliva, which he took great care not to 'swallow whilst he visited the sick*.' Notwithstanding the credit I incline to give to this supposition, yet, as it amounts to no more than a negative proof, I shall not insist on its being a direct evidence, till the fact be corroborated by more conclusive circumstances.

* Med. Annot. vol. 5. p. 472.

circumſtances. The ingenious Dr Lind of Haſlar, who, from the diſcharge of his duty in that hoſpital, independent of his other practice, muſt be equal to moſt of his contemporaries in experience and knowledge of fevers, and whoſe teſtimony, with regard to the facts relating to them, is ſo much to be relied on, ſhows, in ſeveral parts of his writings, his belief, that the contagion of fevers in general is taken in with the ſaliva. Of which knowledge he has availed himſelf in numberleſs inſtances, on the firſt attack of the ſymptoms from infection, by giving an emetic, encouraging perſpiration through the night, and ordering next day a laxative medicine to clear the bowels of the infectious poiſon. By which means the fever was in moſt caſes prevented, even by the emetic alone, as will appear more particularly afterwards. And, in his excellent treatiſe on the means of preſerving the health of ſeamen, when treating of the hoſpital, or apartments of the ſick, he ſays, 'ſwallowing the ſpittle in infected places

'is justly deemed a means of sooner acquiring the taint, upon which account neither the nurses, nor any one else, should be suffered to eat in the hospital *.' This observation is made after advising such as are obliged to visit the sick, to keep constantly chewing something, that they may be obliged to spit frequently. He farther remarks, 'It is usual with some, for preventing their swallowing spittle, to put tobacco in their mouths when attending about the diseased; but those who are in constant use of chewing that plant, are apt to let down part of its juice with their saliva. I would advise such persons to use a slice of the calamus aromaticus, dipt in vinegar, and spit often †.' And in his essay on the diseases incident to Europeans in hot climates, published in 1768, when on the subject of cutting down wood and other laborious employments on shore, he repeats the same advice, by cautioning persons

* Page 111. second edition. † Ibid.

ſons thus engaged in unwholſome places, never to ſwallow their ſpittle *.

128. Though, in general, the infectious effluvia of malignant fevers, act for ſome time on the ſyſtem, before the acceſſion of the fever, yet it frequently happens, when in a highly concentrated ſtate, proceeding from the bodies of perſons dying, from thoſe who have died of theſe fevers, or from the infectious matter accumulated in the foul hoſpital bedding, that perſons breathing theſe malignant vapours are ſeized immediately, or very ſoon after, with ſickneſs, debility, and other ſigns of an approaching fever. The contagious matter appears to act chiefly in the primae viae, and to have a conſiderable effect in increaſing the ſecretions, particularly of the bile. For if, in ſuch a ſituation, an emetic is given, a quantity of phlegm and bile is thrown up, and the fever is thereby often prevented.

* Page 140.

ed. If at this time the bowels are alſo cleared of their contents by a gentle purgative, and a free perſpiration is promoted through the enſuing night, our ſucceſs in throwing, as it were, the cauſe of the fever out of the body, is more certain. But, if no ſuch means are uſed, the fever comes on, and runs through its ordinary courſe. The following examples will throw more light on this ſubject.

129. Mr Oſburn, ſurgeon's mate to the 3d regiment of Guards, after his recovery from an hoſpital petechial fever, gave Sir John Pringle, who attended him in his illneſs, the following account of the manner in which he was ſeized: 'About the mid-'dle of October 1758, the battalion of 'guards having changed their barracks and 'quarters; in conſequence of which, about 'a dozen of beds were ſent from the Cold-'ſtream regiment to the regimental hoſpi-'tal; theſe beds were packed up cloſe, and 'carried into one of the rooms, to be o-'pened

'pened by the matron, in order to be re-
'fitted and cleaned. Mr Oſburn acciden-
'tally paſſing through the room in which
'the beds lay, then juſt opened, at moſt he
'did not ſtay above a minute, and was ſen-
'ſible of an offenſive ſmell, that in leſs
'than half an hour he began to find him-
'ſelf indiſpoſed; but, being obliged to go
'out, continued walking for two hours,
'during which time his head and back be-
'gan to ach, he felt an unuſual laſſitude,
'with alternate fits of heat and cold,
'had no appetite for his dinner, but was
'thirſty, and felt his pulſe quick and ſtrong;
'he went to bed early after drinking ſome
'white wine whey, ſweeted a little, ſlept
'as uſual, and roſe in the morning refreſh-
'ed, went about his buſineſs, and found
'himſelf perfectly well. That evening he
'went into company, and, though he drank
'nothing that was ſtrong, ſtaid till three
'in the morning; during that time he felt
'all the ſymptoms returning. He took a
'draught of milk and went to bed. Af-

'ter

'ter passing a very uneasy night, he rose 'in the morning with a violent pain in his 'head and back, attended with a great an- 'xietas praecordiorum, and oppression at 'his heart, and was so feeble on getting 'out of bed, that he tumbled down. How- 'ever, being of a plethoric habit, and sub- 'ject to inflammatory disorders, he took 'away at once twenty ounces of blood; 'but, instead of being relieved, was sensible 'of the increase of every symptom upon 'the evacuation, and, in particular, was trou- 'bled with heat and thirst. That evening 'Mr Fordyce would have had him take a 'vomit, but which he refused on account 'of the violent pain in his head; he used 'only a saline mixture, with some of the 'pulv. contrayerv. comp. He believes he 'became delirious that night, for he did 'not recollect any thing that happened af- 'ter, unless in the most confused and im- 'perfect manner, except feeling a great 'pain in his eye-balls, with a most into- 'lerable heat in his body, and a great an-

'xiety

'xiety or inquietude from that heat. Mr Oſburn concluded his account with obſerving, 'That he awaked from his delirium 'in about three weeks, and, after becoming 'ſenſible, recollected no material ſymptom, 'unleſs being troubled with a great watch-'fulneſs, and now and then pain in his 'legs. He was taken ill on the 16th of 'October, which was the third day after 'receiving the infection, and that was cal-'led alſo the third day of the fever *.' It appears that the matron, and a ſoldier who aſſiſted in opening out the bedding, ſoon found themſelves indiſpoſed in the ſame manner as Mr Oſburn had been; and, after their recovery, all of them agreed in their account of the manner in which they received the infection on Saturday the 14th; but it was not till Monday the 16th that the ſoldier was obliged to take to his bed; after which the fever run through its ordinary courſe, though the ſymptoms were

* Med. Annot. vol. 5. p. 317.

not of so dangerous a nature in this patient, as those which accompanied Mr Osburn's fever. This Sir John Pringle and Mr Fordice, who attended both patients, most justly attributed to the large quantity of blood taken from Mr Osburn at the commencement of the fever; for it is only when such disorders are combined with catarrhal or inflammatory symptoms, that venesection can be employed with advantage, or even with safety to the patient.

130. In both these cases, the cause of the disease acted on the system till the third day after receiving the infection, before its power had increased so far as to bring on the accession of the fever. At which time, although an emetic, and afterwards a cathartic, or such a medicine as usually operates both ways, as a solution of two or three grains of tartar emetic, given in small doses, every two or three hours, till it has had its proper effect in freeing the primae viae of a morbid febrile colluvies, has the most

moſt ſalutary effects in mitigating the ſymptoms, and rendering the fever, through its courſe, of a milder nature; yet it ſeldom has the effect to put a ſtop to the progreſs of the fever after the cauſe has operated for ſo conſiderable a time in the body. Notwithſtanding, ſuch a practice certainly has the ſalutary conſequence of preventing the fever, when gone into immediately, or within a few hours after receiving the infection, as was the caſe with the matron, who, on the 14th, finding herſelf indiſpoſed, and ſuſpecting that ſhe had received the infection of the hoſpital fever from the bedding, took an emetic, and ſweated in the night, by which means ſhe eſcaped the fever, and continued in perfect health.

131. If a perſon endeavoured to eſtabliſh a theory on a ſingle caſe, I ſhould conſider his doctrine as dangerous, and not to be adopted, unleſs with the greateſt caution. But, where ſimilar inſtances happen frequently, not only in his own practice, but in

in that of others, who had no particular theory to ſupport, or any thing elſe in view than a bare narration of facts, heſitation is leſs neceſſary. Every doctrine, however, concerning a ſubject ſo important as the health of mankind, ſhould be moſt ſtrictly and candidly examined. I ſhall, therefore, give ſuch other proofs of the infection of malignant fevers being taken in with the ſaliva, as ſeem to ſupport this ſuppoſition with the higheſt degree of probability. And although I make not the leaſt doubt of their appearing ſo to many others, yet as it often happens that men reaſon very differently on the ſame fact, I do not expect they will carry that preciſe degree of conviction to every one they have conveyed to me, from the ſucceſs I have had in practice by following the method obſerved by the ſubſequent reſpectable authors, when they ſuppoſed the infection to have been juſt caught.

132.

132. Sir John Pringle, in his correſpondence with the phyſicians of the military hoſpitals in the Weſt Indies, on the ſubject of the yellow fever, has the following paſſage: 'About the concluſion of the fever 'in death, when the body is in the moſt 'corrupted ſtate, then, indeed, the nurſes 'were ſometimes infected from the offenſive breath of the ſick, and, as they themſelves imagined, moſtly at the time the 'patients were expiring. One of the mates, 'upon opening the body of a man who 'had died of the fever, was ſeized with 'all the ſymptoms; but being bled, and having taken five grains of ipecacuan, with 'one grain of emetic tartar, thrice, at the 'diſtance of two hours between each doſe, 'he vomited and diſcharged by ſtool a 'great quantity of green bile, and was well 'next day. Dr Huck (now Saunders), 'uſing the ſame method afterwards with 'thoſe nurſes who ſeemed to have catched 'the diſtemper, always ſucceeded. But this 'contagion was never conſiderable; for the 'patients,

'patients, who, for other diſorders, lay in 'the ſame ward, were ſeldom taken ill of 'this fever.'

133. Dr Lind, who writes in the moſt intelligent and diſtinct manner on the ſubject of infection, ſays: 'In diſcourſing 'with ſeveral who had been infected by 'patients in contagious fevers, they gene-'rally compared the firſt impreſſion to an 'earthy diſagreeable ſcent, received into 'the ſtomach, as from a grave newly o-'pened, but not quite ſo raw as the cada-'verous ſtench. This is a particular ſmell 'that cannot be deſcribed, though it near-'ly approaches to the diſagreeable affecting 'ſcent from a perſon labouring under the 'confluent ſmall pox at their turn, yet not 'ſo ſtrong; but it is well known to the at-'tendants about the ſick, and the nurſes, 'as it uſually accompanies fevers of ex-'treme malignity, and with peculiar diſ-'charges from the bliſtered parts, may be 'reckoned among the moſt conſtant ſymp-

'toms

'ptoms of a bad fever*.' The Doctor, after informing us that the effects of the infection were almoſt inſtantaneous, the perſon being immediately attacked with a ſhivering, ſickneſs, and other ſymptoms of its action on the ſyſtem, obſerves, 'That 'when, from ſuch complaints, there is juſt 'reaſon to apprehend an imminent fever, 'then is the time for the advice of the 'phyſician, as improper treatment, or the 'delay of a few hours, may produce ef-'fects beyond the power of medicine to 'remove. To all who are ſuppoſed to be 'infected by fevers, during this ſtate of ri-'gors, a gentle vomit is immediately to be 'exhibited, before the fever be formed, 'and before the fulneſs and hardneſs of 'the pulſe renders its operation dangerous. 'If the vomit be delayed too long, and e-'ſpecially if bleeding muſt precede it, the 'moſt certain and favourable opportunity 'of procuring ſafety for the patient is paſt.

'The

* Paper on Fevers and Infection, part 2d, p. 62.

'The effects of this antidote are so well 'known in the hospital, and have been so 'fully ascertained by our repeated expe- 'rience, that those who are employed in 'the fever wards, as soon as taken sick, 'have immediate recourse thereto, and it 'seldom fails to prevent the illness which 'was justly to be expected. I have found 'it equally serviceable in preventing relap- 'ses, when it is given immediately after a 'return of the shiverings. Let me add, 'that a loose stool or two should, at this 'time, be procured, either by means of 'the emetic or of glysters *.——There are 'now several nurses in the hospital who 'have been five, six, or seven times infec- 'ted, and thus successfully treated; and I 'have often had two or three of them ta- 'ken ill in a week. I am apt to think, 'that an infection, from whatever impure 'fountain it is derived, does first discover 'itself by affecting the stomach and inte- 'stines.

* Paper on Fevers and Infection, part 2d, p. 65.

'ſtines. It is uncommon to find a caſe of 'this ſort which does not begin with ſhi-'verings, commonly with a ſlight nauſea, 'often a vomiting. This agueiſh ſtate 'continues, with ſome, a ſhorter, with o-'thers, a longer time; after which, a pain 'is often felt to dart, with violence, into 'ſome one or other part of the body *.' From the Doctor's obſervations, as well as my own, the part affected is ſometimes the head, at other times the back; the limbs are often affected with pains, ſimilar to thoſe of the rheumatiſm; and, in ſome particular caſes, the pain attacks the breaſt, under the appearance of a pleuriſy or peripneumony. But, in every caſe, a looſeneſs ſupervening early, or brought on by medicine, is, from its ſalutary effects, thought to waſh away the contagious poiſon, or to diminiſh its force.

134. The foregoing obſervations are applicable to all fevers which are known to

* Paper on Fevers and Infection, part 2d p. 75.

be infectious, or which ariſe from the vapour of putrid animal ſubſtances, and alſo to thoſe occaſioned by the putrid effluvia of ſwamps and marſhy grounds in hot ſeaſons and climates. In all which caſes, the ſtomach and bowels appear to be the parts firſt affected by the operation of the cauſe of the diſeaſe. Sometimes this is ſo ſlow, as ſcarcely to be perceptible to the patient; either from the weakneſs of the contagious matter, or from the ſtrength of the patient; ſometimes from a peculiarity of ſyſtem, which is capable of reſiſting for a longer time than uſual the effects of ſuch malignant vapours, as proves the cauſe of fevers; or it may ariſe from the habit which certain people have acquired to reſiſt the cauſes of theſe fevers. But, from whatever circumſtance this gradual advancement of the diſeaſe may take its origin, we know, from experience, that, when the cauſe has operated for any conſiderable time in the body, the fever, on its acceſſion, can ſeldom be prevented by the exhibition of emetics, ſudorifics,

dorifics, and laxatives, notwithſtanding theſe remedies are of great ſervice in the mitigation of ſymptoms. But when, from the great power of theſe noxious vapours, their action on our ſyſtem is, from certain effects, quickly perceived, theſe medicines given after removing the patient to a free air, and within a few hours of the time when the contagion was received, ſeldom fail of reſtoring ſuch perſons to perfect health. To illuſtrate this by an example; allow me to give an inſtance or two of the ſpeedy and ſurpriſing effects of the marſh miaſma in the production of fevers, and of its influence on the body, according to the different manner in which the patients were treated after receiving the contagion. Lanciſius tells us, that thirty gentlemen and ladies, of the firſt rank and diſtinction in Rome, making an excurſion on a party of pleaſure, towards the mouth of the Tiber, upon the wind ſuddenly ſhifting, and blowing from the ſouth, over the putrid marſhes, twenty-nine of them were immediately

diately seized with a tertian fever. Or rather allow me to say, that nothing being done to free the primae viae from the noxious vapour taken down with the saliva, and it continuing to act on the system, a fever was brought on, corresponding to the nature of the cause then operating on the body. For, besides the evidence already given of the success which usually follows the clearing of the alimentary canal, immediately after there was the strongest reason to suppose the febrile contagion to have been swallowed, I shall contrast this remarkable anecdote of Lancisius, with a similar one from Dr Lind, but where the treatment and success were different: 'A 'company of gentlemen belonging to his 'Majesty's ship the Phoenix, taking the 'diversion of hunting and shooting, at the 'mouth of the river Gambia, by following their game into a large swamp, were 'all of them affected by its putrid effluvia. 'They were immediately seized with a 'sickness, vomiting, headach, and a con-

'stant

'ſtant hawking and ſpitting, from a diſa-
'greeable ſmell, which (as they expreſſed
'it) ſeemed to remain in their mouth and
'throat. Upon their returning to the ſhip,
'each of them was ordered a vomit, which
'immediately removed all thoſe com-
'plaints *.'

135. Were it neceſſary, many other facts and obſervations might be advanced, ſimilar to thoſe already given, in ſupport of the opinion, that the infectious matter of fevers is taken in with the ſaliva, and that the ſtomach and bowels are thereby firſt affected, and from them the reſt of the ſyſtem. But, when a proof of this kind is made as clear as the nature of the ſubject will admit, the running over the tedious detail of a thouſand teſtimonies, in corroboration of what has been already proved, muſt be as tireſome to the reader, as it would be to the writer. I ſhall, therefore, only

* On the Diſeaſes of Hot Climates, p. 138.

only obſerve farther, that the general diſorder in the body, which always accompanies the acceſſion of a fever, is more likely to ariſe from that wonderful extended ſympathy which every part of the body has with the ſtomach and bowels, than to any other cauſe I can poſſibly ſuggeſt. Beſides, thoſe parts which are known to ſympathiſe in a particular manner with the primae viae, frequently ſuffer in a remarkable manner on ſuch occaſions, as the head, the vital organs, the lumbar vertebrae, and the limbs. That phrenzy or high delirium, with which patients are ſometimes afflicted at the commencement of the malignant autumnal fevers, and for which large bleedings have been often with ſo much impropriety ordered, have been frequently cured by a natural vomiting, excited by a quantity of bile and phlegm, or by emetics and laxatives, properly adminiſtered. Hence this alarming ſymptom does not always ariſe from an original affection of the brain, but often from ſympathy with the primae

viae,

viae, when loaded with bile and other acrid colluvies, and where the cauſe of the diſeaſe appears firſt to exert its power. A phrenzy is frequently the firſt and immediate effect of the putrid vapours of ſwamps, eſpecially in hot ſeaſons and climates, particularly when the febrile quickneſs of the pulſe is accelerated by violent exerciſe. This delirium is commonly taken as an unequivocal ſymptom of an ardent fever, and of courſe medical practitioners uſually begin their cure with large bleedings, but without ſucceſs; becauſe of the manifeſt injury they do in ſuch caſes; and of conſequence is a dangerous practice, as appears from the delirium going off with a plentiful ſweat, but returning with its former violence about the ſame time next day, until the diſeaſe ſhows itſelf under the form of a remitting, or intermitting fever, as may be ſeen more particularly by conſulting Sir John Pringle on the diſeaſes of the army *.

136.

* Second edit. p. 167. and 171.

136 I never received much inſtruction, with regard to the origin of fevers, from conſulting meteorological tables, which ſome philoſophers and ſocieties have carried on with ſuch minute exactneſs. I know that an exceſs of cold, and the long continuance of eaſterly winds in the ſpring, are the principal cauſes of inflammatory diſeaſes, rheumatiſms, and ſometimes of intermittents; or, rather, that they occaſion relapſes in thoſe who have been formerly afflicted with ſuch diſorders. That an exceſs of heat and of moiſture produce low malignant fevers, not at firſt remarkably infectious, but ſometimes become ſo, as it were by accident, from the magnitude of the diſeaſe, or numbers being lodged in the ſame apartment or hoſpital, and afflicted with ſimilar diſorders.

137. Under thoſe circumſtances, I always ſuſpect human effluvia ſo much accumulated and exalted in its powers, from the number and morbid condition of the ſick,

ſick, to have a conſiderable ſhare in increaſing the malignity and infectious influence of thoſe fevers. In this way, ſuch fevers as have very little of infectious power under the ordinary form, in which they moſt commonly ſhow themſelves, become remarkably infectious, when, from a ſingularity in the caſe, bad treatment, foul air, or from all theſe circumſtances conjoined, the diſeaſe is puſhed on to a higher degree of malignity and danger than uſual.

138. A common continued fever of a mild ſort, has very little infectious power, and is commonly confined to the perſon accidentally expoſed to the cauſe which produced it. Sometimes ſuch fevers ſeize a whole family, not ſo much from the contagious power of the diſeaſe, as from a ſimilarity of conſtitution amongſt the children, diſpoſing them to be more readily affected than others *. This often happens

* This circumſtance I have ſometimes obſerved to take

from the cold, or quick ſucceſſion of froſts, and open weather in the ſpring, when ſuch fevers frequently become endemic, but not properly contagious, the ſick having caught the diſtemper from the ſame general cauſe; for nurſes, and other attendants, for the moſt part, eſcape the diſorder, (46. 114. 124). The truth is, that no proper fever can be ſaid to be abſolutely without ſome degree of infectious power. But theſe juſt mentioned, and others to be taken notice of afterwards, have ſo little of contagion, when properly managed, that phyſicians ſeldom expreſs the ſmalleſt anxiety on that head.

139. When ſuch circumſtances as are above related, concur to heighten the malignity of the fever, and in ſome meaſure to alter its nature, they then become more or leſs contagious, and I believe all febrile diſorders

take place in children of the ſame family, living at the diſtance of ſome miles from each other.

orders whatever, are, from foul air, and maltreatment, capable of ſuch changes, a common catarrh not excepted. Indeed, I think foul air a more rational way of accounting for the origin of what is called an Influenza, than occult qualities in the air, which have been hunted after for ſo many centuries. The expreſſion is rather calculated to hide our ignorance, than to give the ſmalleſt information relative to the ſource of this moſt infectious diſtemper, conveyed to us from the remoteſt parts of the world, in woolen, cotton, and other materials capable of retaining the infection, and not from any malignant quality in the air, which conveys infection but a very ſhort way. Even the plague itſelf can ſcarcely be communicated by the air a few yards beyond the houſes infected. This peſtilential fever is uſually conveyed from one to another by contact with the diſeaſed, or from an accidental communication of goods. For we know that in Turkey, where this dreadful diſtemper ſweeps off annually ſuch numbers

of

of the inhabitants, that thoſe who are in health can, with impunity, converſe with the convaleſcents when airing themſelves on the tops of their houſes, though there is only a parapet wall between them. The only precaution they uſe is, to avoid ſuch intercourſe when the wind blows directly from the perſon infected. But, when fevers become infectious, and are communicated from one to another, the diſtemper caught being ſimilar to that from which it took its origin, not only ſhows the great variety of ſpecific contagion which may exiſt, but alſo that it appears to act in the courſe of the diſeaſe as a ferment on our fluids, which is corroborated by the inoculation of the ſmall-pox, meaſles, plague, &c.

140. In this ſection I have related ſeveral facts and obſervations concerning the origin of fevers, their cauſes, their action on our ſyſtem, and ſuch other circumſtances as I thought might lead to a more ſatisfactory explanation of certain phaenomena

mena of fevers, than has hitherto appeared. A number of particulars, however, remain ſtill to be treated of, which could not yet be accompliſhed; becauſe they are peculiar to certain ſpecies of fevers.

SECTION

SECTION V.

OF A CATARRH.

141. IN the following diſſertation, I ſhall take no notice of that ſingular ſpecies of contagious catarrh known by the name of *influenza*. Being a fever *ſui generis*, it ought to be treated of ſeparately, and as a diſeaſe diſtinct from the ſimple catarrh. For the ſame reaſon, I ſhall poſtpone the conſideration of thoſe coughs which ariſe from haemoptyſis, ſcrophula, and likewiſe from particular employments, as ropemaking, hemp and flax dreſſing, hewing of ſtones, &c. my deſign being only to conſider the nature and ordinary courſe of a ſimple catarrh.

142.

142. The general idea given by medical writers, of the nature of a catarrh, is taken from the ſuppoſition of a permanent ſpaſmodic conſtriction of the excretory and other ſmall veſſels of the ſkin; by which means perſpiration being proportionably obſtructed, that acrid matter retained in the habit is ſuppoſed to be thrown on the internal membrane of the noſe, fauces, bronchi, and other affected parts, and to give riſe to the ſeveral ſymptoms attending this diſorder. This opinion, concerning the nature and cauſe of a catarrh, appears ſo extremely plauſible, that it is not ſurpriſing it ſhould have received a general approbation.

143. Indeed, an invariable effect of cold, during its application, is a diminution of perſpiration, from the conſtringing action of cold on the ſmall veſſels of the ſkin. But this uſually happens without any injury to the body; for the perſon no ſooner moves into a warmer air than his perſpiration

ſpiration is again increaſed in proportion to the degree of heat applied. But, with regard to the quantity of perſpiration, or degree of cold that may be endured with impunity, cuſtom allows of a conſiderable latitude (100.). Shepherds in the mountainous parts of this country bear the cold of winter ſurpriſingly; and I have known the guides, where ſea-bathing is uſed, have the greateſt part of their bodies immerſed five or ſix hours every day, for ſeveral months together, in water above forty degrees colder than the temperature of their bodies. For, unleſs the cold is ſo intenſe, or continued ſo long as to affect the energy of the nerves, it produces no bad conſequences. I mean not to ſay, that long-obſtructed perſpiration is not hurtful to the conſtitution; for certainly it is often a principal agent in the production of ſcurvy, dropſy, and other diſeaſes: But that a temporary obſtruction of perſpiration on catching cold, or at the commencement of a catarrh, ſhould be the cauſe of that diſeaſe, I have never

never yet been able to comprehend. The ſpaſm on the veſſels of the ſkin, with ſometimes a ſlight degree of rigour, about the beginning of the diſorder, returning at uncertain periods, and commonly of ſhort duration, can have very little influence. For although a free perſpiration contributes, in general, to the relief of the parts affected, as ſhall afterwards be more particularly noticed, yet profuſe ſweats are not uncommon during the continuance of the diſeaſe, without any alleviation of its ſymptoms, when the cauſe of it has operated ſtrongly on the ſyſtem.

144. From the ſtatical experiments of Sanctorius and thoſe of our countryman Dr James Keill, it appears that a conſiderable increaſe or diminution of perſpiration may take place in twenty-four hours without any apparent injury to health, or the ſmalleſt tendency to a cough or catarrh. Dr Keill, who was twice ſeized with a cold during the courſe of his ſtatical experi-

ments, never perceived his perſpiration to be thereby diminiſhed. In conſequence of theſe repeated obſervations, accurately made during the courſe of his diſorder, he, in his ſtatical aphoriſms, declares, 'Adiapneuſtia 'non eſt cauſa tuſſis *,' and refers to his tables and obſervations for the truth of his aſſertion. In his Diſquiſitio Prima, entitled, Impedita Perſpiratio non eſt Frigoris ſuſcepti cauſa, taking a view of the common, but erroneous opinion of obſtructed perſpiration being the cauſe of a catarrh, he ſays, 'At quam aliena a veritate eſt haec conclu-'ſio, obſervationes praecedentes manifeſte 'indicant; etenim eo quo frigus ſuſceptum 'eſt die, et per plures ſubſequentes, in qui-'bus tuſſis graviter affligebat, nullo modo 'diminutam eſſe perſpirationem inveni-'mus. Stabilitae igitur opinioni, et diu 'jam apud omnes receptae, ipſa experien-'tia refragatur; quae quidem per ſe ſatis 'eſt, cur homines, opinioni ſuae, non te-'naciter

* Aphor. Static. p. 17. l. 1.

'naciter addicti, hanc ſententiam non amplius tueantur; at ſi eam rationis etiam trutina ultra examinemus, leviſſimis rationibus primum admiſſam inveniemus.' Through the whole of this diſſertation, and in ſeveral other parts of his writings, he is equally clear and diſtinct with regard to this point. The Doctor being fully convinced, from repeated experience, that obſtructed perſpiration did not attend either the acceſſion or courſe of the catarrh, moſt juſtly concluded, that it could not poſſibly be the cauſe of the diſeaſe. He ſaw that the application of cold to the body, under certain circumſtances, or even to a ſmall part of it, was capable of producing that effect. But, not paying a proper regard to our internal oeconomy, nor attending ſufficiently to the various effects of different ſtimuli on the ſyſtem, the ſympathy between the nerves of the ſkin and thoſe of the mucous glands, internal membrane of the noſe, fauces, and bronchi, when cold is applied in a general way, or to the ſurface

face of any part of the body, ſo as to have ſuch effect on the nerves as ſhall be more particularly mentioned afterwards, he embraces the wild opinion of frigorific particles entering the pores of the ſkin, mixing with the blood, and thereby occaſioning a coagulum or thickening of the whole maſs, in the ſame manner as thoſe particles have been ſuppoſed to bring on the congelation of water in freezing. This effect is certainly produced by a privation or diminution of heat, and not by the introduction of thoſe imaginary particles, the exiſtence of which has never been demonſtrated. But, as it would be foreign to our deſign to enter on any explanation of this doctrine, we ſhall proceed to admit his facts, without adopting his reaſoning upon them. Neither ſhall I here examine the opinion of Sanctorius with regard to the cauſe of fevers. It is ſufficient for our preſent purpoſe to ſhow what that very accurate and learned philoſopher had repeatedly obſerved from his experiments, that no hurt

aroſe

aroſe to the health of the body from a ſtoppage of perſpiration in the winter. His words are, 'Adiapneuſtia, aeſtate ma-'lignam febrem, hyeme vix minimam al-'terationem, efficere poteſt; corpora enim 'acriori perſpirabili aeſtate referta ſunt 'quam hyeme*.'

145. Indeed, the ſympathy between the nerves of the ſkin, from the application of a certain degree of cold, and thoſe of the internal membrane of the bronchi, is ſo remarkable, that many delicate perſons are immediately ſeized with a cough, when part of their body, and eſpecially their feet, have been expoſed to a ſevere cold, independent of the application of cold air to the lungs. And if, the inſtant a perſon perceives it to have this effect, he moves into a warmer ſituation, ſo as to become, in a ſhort time, comfortably warm, the cough ſoon leaves him. But, if he ſhall remain,

* Med. Stat. ſect. 2. Aphor. 35.

main, or be unavoidably expoſed to the cold for ſome time, the cough may continue for a longer or ſhorter period, and be attended with all the effects of a ſlight or ſevere catarrh, according to the time he was ſo expoſed.

146. My late ingenious and learned friend Dr Whytt relates an uncommon and curious caſe of a girl of eight years of age, whoſe ſyſtem had become irritable to a moſt extraordinary degree. But, as conſtantly happens, when a particular part of the body ſuffers more from this diſeaſed irritability than the reſt, ſuch part is uniformly obſerved to ſympathiſe with every part of the body, which is ſtimulated more than the preternatural irritability of the ſyſtem can bear. In the Doctor's patient it was the lungs which ſympathiſed ſo ſtrongly with the reſt of the body, and brought on a convulſive, or what may be properly called, a nervous cough, there being no apparent fixed diſeaſe in the breaſt. For, although

though the girl remained perfectly free from the cough, and with a natural pulſe, whilſt ſhe continued in a horizontal poſture in bed, yet, in ſtanding, kneeling, or in any other poſture, which required a ſtrong exertion of the muſcles, the pulſe roſe to near 200 beats in a minute, and the cough returned, but ceaſed again on lying down, and the pulſe alſo returned to its natural ſtate. The principal view in the hiſtory of this caſe ſeems to have been, to ſhow the anodyne powers of warm bathing, when properly conducted, and that this remedy was ſuperior to any dry heat, to that given by warm wet flannels, and, in ſome caſes, even to opium itſelf. For, beſides the heat and moiſture accompanying warm bathing, ſo agreeable to the nerves, and which recovers their powers in ſo remarkable a manner, (parag. 35.) the inexpreſſibly ſoft application of the water to the very delicate terminations of the nervous filaments on the ſurface of the ſkin, has a very uncommon and remarkable effect

fect in ſoothing the nerves, and leſſening the preternatural ſenſibility of the ſyſtem. But it was remarkable in this patient, that the application of cold to any part of the body, immediately brought on a fit of coughing, whether in a horizontal poſition in bed, or in a ſtanding, or ſitting poſture. Nay, when the cough was ſtopped by the anodyne powers of the pediluvium, and whilſt her legs continued to be immerſed in it, if a bottle of cold water was applied to any part of her body, or her hands immerſed in cold water, the cough was renewed, but ceaſed in a ſhort time after removing the bottle or cold water from her hands, if her feet remained covered with the warm water. This might, no doubt, ariſe from the peculiar ſenſibility of the lungs, and the particular effect of ſtimuli, in general, on that weak part, (parag. 41. 42.) But, it muſt alſo be remarked, that the ſtimulus of cold ſeems to be ſpecific with regard to the lungs.

147.

147. After what has been ſaid in Section III. we come now to take a more particular view of the effects of cold on the body. This, in general, muſt be conſidered as ſalutary, from the aſſiſtance it gives in regulating the ſtandard heat; and in proportion to its operation in this way, it muſt give more or leſs vigour to the ſyſtem. Its tonic powers, during cold and dry ſeaſons, in ſtrengthening the ſolids, and the uſe of the cold bath, when properly adminiſtered, are likewiſe remarkable. But, if the cold be ſo intenſe as to diminiſh or diſturb the power of the nerves as conductors, and, of courſe, alter their natural mode of action in any particular part of the body, a morbid circulation, ſecretion, &c. muſt take place in the part ſo affected. If the cauſe has acted in a ſlight manner, the effects of it may be ſoon overcome by the ſtrength of the ſyſtem, the affected nerves being gradually brought to act in their natural manner. But, if the cold ſhall have operated ſo ſtrongly as to

induce a more permanent morbid affection of the nerves, then a general ſympathy of the ſyſtem with the diſeaſed part, gradually takes place, (parag. 40. and 47.) and is accompanied with a laſſitude and preternatural irritability, approaching to that of pain. This general uneaſineſs is known to every perſon who has ever been affected with a cold.

148. What is called *creaks* in the neck, rheums in the head and other parts of the body, ariſe from ſitting at open windows, doors, or being otherwiſe expoſed in cold weather. It ſeldom happens that the perſon ſo affected is immediately ſenſible of any bad effects, from his body, or part of it, being thus expoſed to the cold. It is not till the next day, or perhaps the ſecond or third day after, that he begins to complain and recollect the cauſe of his diſorder.

149. This common, but curious fact, is ſimilar to what happens in the operation of the

the cauſes of other febrile diſeaſes. From the commencement of their action on the body, ſome time muſt elapſe before the ſyſtem in general can be affected by them, ſo as to produce the diſeaſe correſponding to the nature of the cauſe. The ſymptomatic fever, in conſequence of wounds, amputations, and other chirurgical operations on the body, is ſeldom conſiderable till the third day after they have been performed. There is, indeed, ſometimes a tendency to fever from the time of the accident or operation, which gradually increaſes according to the degree of pain with which the wound is attended. But the general cauſe of irritation commonly requires ſome days before the whole ſyſtem can be brought to ſympathiſe with the ſeat of the diſorder. Beſides, from a law in the oeconomy, inflammations, in conſequence of wounds, arrive not at any remarkable height till about the third day, and they often riſe no higher than is neceſſary for the production of pus.

150.

150. In like manner, if any part of the body is affected by the application of cold, ſo as to alter the natural mode of action in the nerves, by which a change is brought on the circulation in the ſmall veſſels of that part, this commencement of a diſorder may happen without pain, or any apparent ſign of morbid affection. For a ſlight deviation from the ordinary courſe of circulation in the capillary veſſels is not attended, for ſome time, with any ſenſible inconvenience. But the effects of it in the part where ſuch change has taken place, and afterwards in the ſyſtem, muſt always be proportioned to the cauſe, and the ſtrength of conſtitution to reſiſt its force. This cauſe will go on ſlowly, to act with an imperceptible ſtimulus, (par. 47.) till the ſyſtem in general is affected by it, exciting more or leſs fever, or that kind of diſagreeable ſenſation over the body which generally precedes the acceſſion of fevers. At this time the perſon complains of pain in the part firſt affected, which is often unattended

tended with any perceptible ſwelling, though ſometimes a ſlight degree of puffineſs in it is obſervable.

151. This ſympathy of the whole ſyſtem with a part of it morbidly affected, which is ſo general, but ſo little attended to, has been particularly taken notice of from par. 49. to par. 59. where I have endeavoured to ſhow how certain ſtimuli chiefly affect particular parts of the body. In the preſent caſe, when a perſon is ſeized with a cold, in the manner above mentioned, it ſeldom fails to affect the membrane of the noſe, ſometimes the amygdalae, and other glands about the throat; but more frequently thoſe of the internal membrane of the trachea and its branches, by which the natural ſecretion of all thoſe mucous glands is changed. The ſecretion, in general, is increaſed and more acrid than uſual; and a conſiderable diſcharge of a thin ſharp rheum from the noſe, glands of the throat, and fauces, takes place. The eyes are commonly

monly dull and watery; and, from a general ſwelling of the membrana Schneideriana, and collections of mucus, there is an unuſual difficulty of breathing through the noſe, accompanied with a ſenſe of heavineſs in the forehead, and a dull pain above the frontal ſinuſes. Theſe complaints have ſometimes got the name of coriza and gravedo. But the moſt conſtant complaint in a catarrh, is a troubleſome cough, ariſing from a morbid ſecretion of phlegm in the lungs. At firſt there is a tickling cough, from an increaſed ſenſibility of the internal membrane of the bronchi, with little or no diſcharge of mucus, from a ſpaſmodic conſtriction of the excretories of the glands, and even of the ſmall branches of the bronchi. But, as this ſpaſmodic affection goes off, the expectoration gradually increaſes, becomes thicker, and by degrees diminiſhes in quantity until the morbid ſecretion ceaſes with the recovery of the patient. The cough, in general, returns in fits, and continues till the accumulated ſharp mucus in the

the lungs is expectorated. This expectoration is often retarded in ſevere fits of coughing, by a temporary ſpaſm and contraction of the branches of the trachea, cauſing a wheezing, with an uneaſy ſenſation of fullneſs in the breaſt, which ariſes from ſome obſtruction to the paſſage of the air in reſpiration, and to the blood through the veſſels of the lungs during the continuance of the ſpaſm. The ſenſe of fullneſs uſually ſubſiſts till a quantity of phlegm is forced up from the lungs by inceſſant coughing. The perſon is then freed from the cough till the bronchi are again ſtimulated by another accumulation of mucus. In this way the cough goes on for an indeterminate time, according to the ſeverity of the diſorder, the conſtitution of the patient, the manner in which he has been treated, or has managed himſelf during the courſe of the diſeaſe; for, after a ſlight degree of feveriſhneſs, which commonly attends this complaint for the firſt three or four days, goes off, though the cough continues

tinues to be troubleſome; yet, being free from pain or ſickneſs, and ſuppoſing himſelf in other reſpects in good health, the diſorder in his breaſt is neglected. He is tempted, on account of buſineſs or pleaſure, to expoſe himſelf too freely to the cold air, by which means that preternatural irritability brought on the internal membrane of the bronchi is kept up, and the increaſed ſecretion and cough are often protracted for a conſiderable time. For, when the ſyſtem is once morbidly affected, or even after the patient has apparently recovered from his indiſpoſition, cauſes of the ſame kind, though greatly inferior to what was at firſt neceſſary for the production of the diſeaſe, will exaſperate it, or ſubject the perſon to a relapſe often more ſevere than the firſt attack. This ſeems to be the reaſon why people labouring under a catarrh, or juſt recovered from it, are ſo ſoon and ſo ſenſibly affected by cold air.

152.

152. When a cough from a catarrh has continued for a conſiderable time, beſide the mucous glands, thoſe of the ſtomach come likewiſe to be affected. A larger ſecretion than uſual takes place, the appetite fails, and, from the ſympathy of the lungs with the ſtomach, (par. 43.) the cough becomes more frequent and troubleſome, which explains the utility of emetics in coughs of ſome ſtanding.

153. Though a catarrh generally affects the mucous glands, becauſe they are leſs capable of reſiſting the action of ſuch a degree of cold as is ſufficient to produce that diſorder, than other parts of the body, (par. 41. and 42.) yet it ſometimes happens, from a peculiarity of conſtitution, but more frequently from the effects of ſome former diſeaſe, that particular parts of the body acquire a greater degree of irritability than the reſt, and of courſe are more liable to be affected *. It is in this way that inflam-

 mations

* The late Dr John Clerk of Edinburgh, who was deſervedly

mations of the eyes, agueiſh, rheumatic, and gouty complaints, diarrhoeas, fits of the gravel and ſtone, &c. are ſo frequently the

deſervedly reputed to be one of the beſt practical phyſicians in his time, in a letter to Sir John Pringle, on the ſuppoſition of moiſture getting into the blood by the lungs being the cauſe of a catarrh, or of other diſorders which are ſuppoſed to ariſe from cold, gives the following remarkable paſſage. With regard to the ſuppoſed entry of moiſture by the lungs, he ſays, 'This 'I doubt much, is not true, from my experience, and 'I know none apter to be affected by it. It is certain, 'if I paſs through a new waſhed room, my legs turn 'ſtiff, though the paſſage is of no longer duration than 'a few ſeconds of time; and, if I continue in it a little 'longer, the ſtiffneſs aſcends gradually, till it affects 'the left kidney, or the tonſils, my two weak parts. 'This gradual, though very quick influence, I cannot 'aſcribe to the entry of moiſture by the lungs, or even 'to any change brought on the blood by its ingreſs at 'the pores of the ſkin, but merely to a ſtoppage of the 'pores. Wet ſheets, an experiment I never tried, 'have the moſt pernicious effects of any kind of moi'ſture; yet it is more than probable, that this moi'ſture acts immediately on the ſkin.' Med. Annot. M. S. by Sir John Pringle, vol. 4. page 412.

the conſequences of an acceſſion of cold in people who have been often affected with any of theſe diſeaſes. For the ſeat of the diſorder, from repeated attacks, acquires at laſt ſuch a degree of mobility as produces returns of the ſame complaint, from cauſes different from thoſe by which it was originally occaſioned. Every one of the diſeaſes mentioned, I have known to have ariſen from cold; and, indeed, nothing is more common.

154. The immediate cauſe of a fit of the ſtone being more or leſs of inflammation on the internal coat and neck of the bladder, with an increaſed ſenſibility, correſponding to the degree of inflammation, there will be conſiderable pain on the leaſt motion or friction of the ſtone againſt the parts affected. This pain is greatly augmented on every effort to make water, and for ſome time after it is made, from the action of the detruſor urinae, abdominal muſcles, &c. on the diſeaſed part, in expelling

pelling the urine, which, from the great irritability of the urinary paſſages, appears to be immenſely hot. Such an inflammation, or fit of the ſtone, is often the conſequence of a cold, and perſeveres while the cauſe of it continues to act on the body, or rather till the ſyſtem, by returning to its natural ſtate, after the cauſe has been removed, (parag. 46.) loſes that preternatural irritability acquired on the acceſſion of the cold.

155. Though it would be foreign to our preſent ſubject to explain the particular cauſes of theſe fits, yet it may not be improper to take notice of indigeſtion, acidity, and other acrimony in the ſtomach and bowels, as inſtances of ſtimuli acting at a diſtance from the parts to which they are applied, (parag. 41. and 47.) For, the ſyſtem becoming thereby more irritable, the diſeaſed ſtate of the bladder will render it leſs capable of reſiſting the general effects of ſtimuli, and more liable to be affected with

with a preternatural ſenſibility than the reſt of the body, independent of the ſympathy which ſubſiſts between the ſtomach and urinary paſſages.

156. In every ſevere catarrh, there being more or leſs of a tendency to inflammation, after the patient has got rid of his cough, and ſeems to be perfectly recovered from his indiſpoſition, there may frequently remain, in different parts of the ſubſtance of the lungs, ſmall obſtructions, without any apparent inconvenience. It is highly probable, that a gradual reſolution of ſuch obſtructions takes place, eſpecially if the perſon eſcapes a return of the ſame diſorder for any conſiderable time. But if, from repeated colds, theſe obſtructions increaſe in number and obſtinacy, they become at laſt irreſolveable, and lay the foundation of what are called tubercles in the lungs, which are ſometimes attended with difficulty of breathing on any briſk or violent exerciſe, and are often the cauſe of

a chronic dry cough. But, as theſe complaints are temporary, and not accompanied with pain, the danger of the diſorder is frequently overlooked, till, by ſome future catarrh, they are irritated into a ſtate of inflammation, and afterwards ſuppurating, bring on a phthiſis pulmonalis, the moſt treacherous and mortal of all diſeaſes.

157. Some people have larger ſecretions of phlegm in the cavities of the veſicles and bronchi than are neceſſary for defending their internal ſurface from the effects of cold air in reſpiration, or preventing the ſides of the veſicles and bronchi from growing together; and, of courſe, from every ſuch accumulation of phlegm, a fit of coughing muſt be excited.

158. Every one who has been afflicted with a ſevere catarrh, ending in a troubleſome cough of long duration, becomes more liable to returns of it, on catching cold, than he was before the firſt attack of that

that diſorder. Such a perſon comes, by degrees, to have larger ſecretions of phlegm in his lungs than formerly, and, in conſequence of it, frequent fits of coughing, without any acceſſion of cold, eſpecially in the winter or cold weather, partly from a diminution of perſpiration, but chiefly from the general operation of cold on the body. This gradually increaſes as age advances, and often proves not only the cauſe of habitual coughs, but of humoral aſthmas and peripneumonia notha, which laſt is uſually brought on by a catarrh.

159. From the foregoing obſervations we perceive, that a diſeaſe ariſes in the body without the introduction of a materies morbi, but merely from an exceſs of ſtimulus, by which the powers of the nerves, and their action on thoſe parts where the ſtimulus was applied, are altered from their natural ſtate. When this morbid affection ariſes to ſuch a degree, that it cannot ſoon be overcome by the ſtrength of the ſyſtem, then

then the whole body ſympathiſes with the part firſt affected. But, as all parts of the ſyſtem are not equally capable of reſiſting the effects of certain ſtimuli, on account of a variety in the ſpecies of ſenſibility and irritability of different nerves, (parag. 68. 69. and 70.) or from a preternatural mobility in thoſe of particular parts, (parag. 153.) we know that they become more liable to be affected by ſtimuli in general. From theſe circumſtances we learn, that, although the whole ſyſtem muſt be more or leſs diſturbed by every ſtimulus acting in a powerful manner on any part of the body; yet it appears from the above diverſity of irritability in the nerves, from a morbid ſenſibility in particular parts, or from a difference in the nature of the ſtimuli themſelves, ſome poſſeſſing ſuch a ſingularity in their mode of action as adapts them to act more powerfully on certain nerves at a diſtance, than on thoſe nearer, or in the part of their application, that it cannot be thought that ſtimuli will always

act

act in a general way on the ſyſtem. We every day experience the reverſe in many inſtances, where certain parts are chiefly affected, ſometimes characterizing the diſeaſe, and even pointing out the nature of the cauſe, whilſt the reſt of the body ſuffers only in a ſlight way, from general ſympathy. This is almoſt, in every point, the caſe with a ſimple catarrh, which generally affects the mucous glands, (parag. 150. 151. and 152.) except in ſuch inſtances where a peculiarity of conſtitution, or ſome former diſeaſe, have given a particular turn to the diſorder. This may ſometimes happen, when cold acts only as the occaſional cauſe of ſome other diſeaſe, where a prediſpoſition to it exiſts ſtrongly in the habit.

160. On the acceſſion of a catarrh, a preternatural irritability is brought on the whole ſyſtem, but is moſt remarkably felt in thoſe parts, which, from the nature of the cauſe, are particularly affected: Theſe

are the mucous glands of the noſe, fauces, and bronchi. Their ſecretion is increaſed; but, being of a morbid nature, it becomes more acrid than uſual. Thus, the mucus, when ſecreted, ſtimulates the glands and their excretories to a farther increaſe of ſecretion, which often occaſions a very large diſcharge of ſharp mucus. In this diſeaſe there is a general tendency to inflammation; in proportion to the degree of inflammation the pulſe quickens, becomes ſtronger and fuller, and thirſt increaſes. But the dangerous conſequences of this diſpoſition are greatly leſſened by the conſiderable evacuation of mucus from the glands. The more free and copious this evacuation is, with reſpect to the magnitude of the diſeaſe, the leſs is the hazard of inflammation, which is generally the conſequence of this ſecretion being ſtopped or conſiderably diminiſhed, from a morbid circulation in the glands, which ſometimes extends to the ſubſtance of the lungs.

161.

161. A ſimple catarrh, when the ſymptoms do not run high, under proper management, and even without much aſſiſtance from medicine, commonly ends in ſix or eight days. But when, on account of neglect, improper treatment, or ſeverity of the ſymptoms, the advice of the phyſician becomes neceſſary, the curative indications, from the view we have taken of this diſorder, are, firſt, to take off all tendency to inflammation; ſecondly, to free the ſyſtem from preternatural irritability; and, thirdly, to rectify the morbid ſecretion of the mucous glands.

162. The principal circumſtance to be attended to in the cure of a catarrh, is, to remove, as much as poſſible, all tendency to inflammation; for, of all the ſymptoms which accompany this diſorder, none are ſo dangerous, eſpecially in the lungs. Nothing is ſo ready to relieve the breaſt, or take off a partial inflammatory diſtention of the ſmall veſſels, from an exceſs of ſtimulus

mulus in particular parts, as a free and gentle perſpiration. The benefit ariſing from this ſalutary evacuation, is not ſo much its removing the effects of an obſtructed perſpiration, as by its relieving and rectifying internal morbid ſecretions, which it certainly does on many occaſions. With this view, the patient ought to be confined to bed, in a room kept moderately warm, but not heated beyond that of a temperate day in ſummer, which, in ſome caſes, where the fever is high, may be too great. He ought to be reſtricted to a mild vegetable diet; and we uſually preſcribe with advantage diluent acid drinks, breathing the ſteam of warm water, warm bathings, and keeping the body open with gentle laxatives, for which purpoſe, neutral ſalts ſhould, for the moſt part, be preferred.

163. If, notwithſtanding a ſteady proſecution of this plan, the fever, or other ſymptoms, do not abate, bleeding muſt be uſed

uſed freely, and repeated according to the urgency of the caſe. In a ſevere catarrh, bleeding is generally the firſt means of relief, and ſhould be ordered without heſitation or delay; eſpecially if, from ſome difficulty of breathing, accompanied with pain in the breaſt, the danger of an inflammation is ſuſpected. For, from the relaxing and debilitating effects of bleeding, when directed with judgment, it is of the greateſt ſervice in ſuch caſes. But, as relaxation and debility may be carried too far, circumſpection muſt be uſed, that it be not proſecuted beyond the ſtrength of the patient, or what the ſymptoms may require. (parag. 14. 15. and 34.) After which, when there is a tendency to topical inflammation, or when it has actually taken place, a bliſter ſhould be applied as near as poſſible to the part affected. It often carries off, or conſiderably diminiſhes the internal ſtimulus, and of courſe leſſens the inflammation. Neutral ſalts may be given frequently in ſmall doſes, particularly nitre

from

from 4 to 10 grains, with a double quantity of cryſtals of tartar, every two, three, or four hours, in a glaſs or tumbler of water, ſweetened with ſugar. Theſe powders, ſufficiently diluted, aſſiſt in abating the feveriſh heat, and in agreeably allaying thirſt, provided too large a quantity of nitre is not uſed, which diſagrees with certain conſtitutions. Purging with a ſolution of Glauber or Rochelle ſalts, is alſo of ſervice. This medicine is improved by an addition of juice of lemons.

164. The ſecond and third indications are, in a great meaſure, anſwered by what has been already propoſed in the preceding paragraph. But, in a variety of caſes, we muſt have recourſe to ſuch means of relief as may be beſt ſuited to particular conſtitutions and ſymptoms of the diſeaſe. The cough is uſually the moſt troubleſome; for which mucilaginous and oily mixtures, emulſions, the acetum ſcilliticum, ſolutions of gum arabic, pectoral infuſions, &c. are uſed

uſed by turns with advantage. Here I omit mentioning the warm pectorals, as they are more calculated for chronic coughs than thoſe which ariſe from a recent catarrh, eſpecially if attended with any degree of fever. But the medicine I have the greateſt dependence on, in leſſening the general ſenſibility of the ſyſtem, and in moderating the mucous ſecretions, is ſmall doſes of opium, not above one-ſixth or eighth of a grain at a time, compounded in a lozenge, as the trochiſci behici nigri of the Edin. Diſpenſatory *, repeating it occaſionally according

* In February 1782, I was conſulted for a young man of 25 years of age, of a ſtrong and healthy conſtitution, then ill of a catarrhal fever. From an inceſſant dry cough, difficulty of breathing, pain acroſs the breaſt, fluſhed face, and the pulſe at 120 beats in a minute, I ſuſpected a tendency to peripneumony. But by large bleedings, bliſtering, and other means uſed for his recovery, thoſe dangerous ſymptoms, with the fever, left him in a few days. After this a troubleſome teazing cough remained, ſeeming to depend on a preternatural irritability which his diſorder had left on the internal

cording to the ſeverity of the cough, giving from one grain to one grain and a half of opium in 24 hours to an adult, and proportionally to younger patients. Theſe lozenges, when allowed to diſſolve gradually in the mouth, I have thought had a better effect in removing the cough, than when taken in the form of pills. But I commonly accompany the exhibition of them with a weak ſolution of emetic tartar, from one

internal membrane of the bronchi. I ordered a few of theſe lozenges, directing him not to exceed ſeven, which contained a grain of opium, in the day; however, as he found ſo much relief from the uſe of them, he took 26 in leſs than 12 hours, which miſtake, at firſt, gave me ſome uneaſineſs; but the only conſequences were, that he appeared as if drunk, from the quantity of opium he had taken, and that his cough was entirely removed. But it muſt be remarked, that ſo liberal a uſe of opium is always attended with danger. For the ſame perſon, about ſix months after, was ſeized with a catarrh, and he had recourſe, without advice, to the above lozenges; and, taking them nearly in the ſame quantity, during the febrile ſtate of his diſorder, was ſeized with a ſevere aſthma, from which he recovered with difficulty.

one to two grains in eight or ten ounces of a common ſaline mixture; but ſeldom exceed one grain when the tartar is good, giving about one eighth for a doze every two, three, or four hours. By this means a gentle perſpiration is kept up, the preternatural ſenſibility on the lungs is abated, the mucous ſecretions are leſſened, and by the ſpaſmodic conſtriction of the bronchi, from the former irritability of their membranes, and ſharpneſs of the phlegm being conſiderably diminiſhed, expectoration becomes more free and eaſy. In ſome caſes, particularly where the catarrh is accompanied with pains in the ſhoulders, neck, arms, and other parts, I prefer to thoſe medicines 10 grains of the pulv. Doveri every two hours till a ſweat is procured, ſeldom exceeding half a drachm of this powder. But, where the perſon cannot be ſtrictly confined, I uſe the powder of ſquills, made into pills with ſoap, in ſuch proportion that each pill contains half a grain, giving two of them twice a day, along with the lozenges,

which I ſeldom have occaſion to do above three or four days.

165. After this ſhort view of the nature, cauſe, and cure of a ſimple catarrh, it might be expected that I ſhould proceed with my inquiry into thoſe diſeaſes which are often the conſequence of it, as peripneumony, conſumption, tubercles in the lungs, &c. But, as my intention is not ſo much to give a ſyſtem of phyſic, as to examine into the nature of the cauſes of certain fevers, and to point out their operation on the ſyſtem, as far as facts, experience, and obſervations, can ſerve to illuſtrate theſe ſubjects, I ſhall proceed to the conſideration of the catarrhal fever.

SECTION

SECTION VI.

OF THE CATARRHAL FEVER.

166. THE circumſtance moſt difficult to be accounted for in the hiſtory of fevers is their acceſſion; a diſtinct knowledge of the proximate cauſe of which muſt be of the utmoſt conſequence in giving us a juſt idea of the true nature of fevers in general. This I ſhall endeavour to inveſtigate from the hiſtory of a catarrhal fever, which I conſider as a febrile diſorder of a middle nature between a common cold and that of an inflammatory fever, not unfrequent when catarrhs are general, from cold and moiſt weather ſucceeding the heat of ſummer and autumn, and

and likewiſe from the ſame ſudden changes during the ſpring. This ſpecies of fever is perhaps the moſt unfavourable for ſuch an explanation; but, if I ſhall be ſo fortunate as to ſhow even a probability of certain morbid conditions ariſing in the body previous to the acceſſion of ſuch a fever, I make little doubt of being capable of illuſtrating my doctrine in the moſt ſatisfactory manner, when we come to treat of the *proximate cauſe of remittent and intermittent fevers.*

167. In the preceding ſection I have endeavoured to ſhow, and I hope in a ſatisfactory manner, that a catarrh ariſes from the ſtimulus of cold applied to the ſkin, and a ſympathy between the ſkin and the mucous glands of the lungs, &c. without any materies morbi. This, at leaſt, is the nature of the affection on its firſt approach. In its progreſs, indeed, by reaſon of the diſordered ſtate of the circulation and ſecretion, the mucus ſecreted by theſe

glands

glands acquires an unnatural acrimony, which may in ſome meaſure be conſidered as a materies morbi, morbid effects being induced by it in proportion to the increaſed irritability of the parts to which it is immediately applied. By a continuance of the diſeaſe, the mucous glands of the ſtomach come alſo to be affected. Hence the efficacy of emetics, in curing a catarrh, was explained: But if the diſeaſe, whether from the powerful effects of the original ſtimulus of cold, or from any ſubſequent cauſe, ſhould reſiſt the uſual means of treatment, this viſcid phlegm ſecreted in the ſtomach, though once diſcharged, will ſoon again be collected, and then proves a ſtimulus to the whole body, not ſo much by reaſon either of its quantity or acrimony, as by reaſon of the preternatural irritability of the ſyſtem in general, and eſpecially of the ſtomach itſelf. This irritability of the ſtomach is now ſo great as to render this organ incapable of bearing even the ordinary ingeſta of a healthy ſtate, without

without manifeſt injury to the body; and it appears to be the immediate active cauſe of the numerous ſymptoms which precede and accompany the acceſſion of a fever, which do not admit of a ſatisfactory explanation on any theory of fevers I have ſeen; but, from the above view of that general morbid irritability that ſo conſtantly accompanies every febrile condition of the body, in which the ſtomach ſuffers ſo remarkably, are not of ſuch difficult ſolution. But, before any farther illuſtration of this proximate cauſe, it may be proper to give the following ſhort hiſtory of the catarrhal fever of a particular ſeaſon, which I prefer to any ſtudied deſcription taken from books; for from a faithful, though looſe narrative of this kind, taken down without any view to the doctrine I am endeavouring to eſtabliſh, we are more likely to receive a juſt notion of the true nature of this diſorder. We ſhall afterwards proceed to conſider the ſeveral remarkable circumſtances and ſymptoms which attend its courſe, and alſo the

the moſt ſucceſsful means of cure; from all which I hope to be able to draw ſuch unequivocal concluſions as ſhall tend greatly to confirm the account I have juſt now given of the immediate cauſe of fevers in general.

168. After a warm and dry ſummer in the year 1758, the weather in the month of October was remarkably cold and moiſt. Catarrhs and fevers became frequent; and, as almoſt invariably happens in ſuch ſeaſons, thoſe who had formerly been afflicted with particular diſeaſes, as agues, diarrhoeas, gout, rheumatiſm, coughs, ſore throats, hyſteric, hypochondriac, and other anomalous complaints, ariſing from a preternatural delicacy of ſyſtem, with a particular morbid affection of the ſtomach and bowels, commonly called nervous, had a return of their diſorders. The above change in the weather was not felt with equal ſeverity throughout the iſland; neither were the fever and catarrh general.

I did not learn that this fever extended ſo far ſouth as Yorkſhire, or northward beyond Dundee. The ſick were ſometimes affected for two or three days with the common ſymptoms of a catarrh. Some ſpit blood; others bled at the noſe; and in all of them there was a diſpoſition to inflammation, with an increaſed force in the arterial ſyſtem. The acceſſion of this fever was in general accompanied with a wearineſs and laſſitude, headach, coldneſs, and ſhivering, rheum from the eyes, noſe, and mouth, frequently a looſeneſs, ſometimes a ſore throat, and a number of other ſymptoms of a catarrhal fever, varying in different patients, as did the frequency and hardneſs of the pulſe, according to the violence of the fever.

169. Although I have choſen the above ſeaſon as an example of the effects of cold and moiſture on the human body in the production of fever, becauſe I kept an exact record of it, yet all phyſicians meet with

with ſimilar inſtances every year. This fever commences with the cold weather at the end of autumn, continues through the winter, and becomes more frequent in the ſpring, eſpecially when there is a ſucceſſion of ſudden changes in the weather. Theſe changes, from temperate to cold and moiſt, contribute to produce the diſeaſe under the form of a continued fever, with an inflammatory tendency. The pleuriſy, peripneumony, angina, and other topical affections which ſometimes accompany it, ſhow the nature and origin of the diſorder.

170. During the prevalence of catarrhal diſorders, we often meet with the common continued fever. This, with reſpect to its cauſe, is more complicated than the catarrhal fever; and I ſuſpect ſometimes marſh miaſma, but more frequently human effluvia, to be concerned in the production of it. This diſeaſe is not, in general, accompanied with topical inflammation; and, after a few days continuance, the pulſe loo-

ſes that fullneſs and hardneſs which indicated ſome tendency to inflammation at its commencement; for the effects of the cold muſt not be conſidered as the ſole cauſe, but rather as co-operating with other cauſes in producing this diſeaſe. If I ſhall therefore, in this ſection, uſe the expreſſion *continued fever*, I wiſh to be underſtood to mean the diſeaſe juſt mentioned, or the catarrhal fever after it has put on the form of the continued fever, which frequently happens.

171. Since the above deviation from a healthy ſtate is uniformly the effect of a ſudden change from hot, or even temperate and dry, to cold and moiſt weather, eſpecially when this laſt continues for any conſiderable time, it muſt be of importance to inquire into its particular mode of operating on the human body, in producing ſuch changes from a healthy to a morbid ſtate, as will in moſt caſes neceſſarily conſtitute the

the proximate cauſe of a continued or inflammatory fever.

172. The firſt circumſtance that demands our attention is the cold and moiſt weather, as the remote cauſe of this diſorder. For, although the effects of ſuch degrees of cold as do not diſturb either the natural powers of the nerves or the regular performance of their offices, tend to ſtrengthen the fibres, and, of courſe, to give alacrity and firmneſs to the whole ſyſtem, (parag. 147. and 148.) yet, when the application of cold exceeds the above limits, in proportion to the exceſs with which it acts in diminiſhing the powers of the nerves, the arterial ſyſtem is chiefly affected, and there ariſes in the habit a diſpoſition to inflammation, which diſcovers itſelf on the leaſt acceſſion of fever from intemperance, catching cold, or other occaſional cauſes. This ſufficiently accounts for the ſpitting of blood, bleeding at the noſe, plethora, and increaſed force in the arteries. But the mucous

glands

glands being the principal ſeat of diſorders ariſing from the ſtimulus of cold, which, in this reſpect, may be called ſpecific; rheum from the eyes, noſe, and mouth, coughs, and ſore throats, are almoſt the conſtant attendants of a catarrhal fever.

173. When cold has operated on the body in the manner mentioned in parag. 148. though its effects muſt, in general, be the ſame, yet they will vary in different people, according to its intenſeneſs, the time of application, the ſtrength of the perſon, the peculiarity of conſtitution, or the patient having been formerly ſubject to ſome particular diſeaſe. For, in this laſt caſe, the effects of cold appear not under the form of a catarrh or a catarrhal fever, but under that of the former diſorder with which the patient had been afflicted; as the ague, diarrhoea, gout, rheumatiſm, ſtone, ophthalmia, ſore throat, or diſorders of the ſtomach and bowels, ſuch as hyſteric, hypochondriac, and nervous complaints. Though the mu-

cous

cous glands are chiefly affected by an exceſs of ſtimulus from cold, yet any perſon who has formerly been afflicted with any of the above diſeaſes, the cauſes which produced them having acted for a conſiderable time on certain parts of the body, a preternatural irritability is induced, which renders them leſs capable of reſiſting the effects of ſtimuli, in general, than the reſt of the ſyſtem, and, of courſe, ſubjects ſuch perſons to returns of their former diſeaſes.

174. It has already been obſerved, (parag. 149.) that the cauſe of a diſeaſe may act for ſome time, without any apparent injury to the ſyſtem; or, if its effects are perceptible, they are commonly of ſo mild a nature as not to be much attended to by the patient. His appetite is, perhaps, leſs keen, and his complexion a little paler than uſual. He complains of a dull headach, or of a confuſion in the brain, of ſlight pains in different parts of the body, and of a wearineſs, as if under the influence of a trifling

trifling cold. But theſe complaints are apparently ſo mild, that they prevent him not from attending either to his buſineſs or his pleaſures, for ſome days. This inattention to the diſeaſe is ſtill more remarkable in putrid fevers; for the perſon often goes about ſomewhat indiſpoſed for ſeveral days before the acceſſion of the fever. But, in the former caſe, perſons are generally ſeized ſuddenly, and without the leaſt forewarning of the impending inflammatory diſeaſe. To theſe obſervations there are ſome exceptions. Inflammatory diſorders ſometimes make their approaches ſlowly, whilſt fevers of a more putrid nature attack the patient as if it were by ſurpriſe. But, in general, the contrary uſually takes place with regard to the manner in which theſe two different fevers make their attack; the reaſon of which appears to be, that, in the one caſe, the acceſſion is accelerated, and heightened by ſome inflammatory pain. This is ſufficient of itſelf to give a conſiderable velocity to the circulation, and, when

when unaccompanied with the febrile ſtimulus of proper fever, as in the toothach, the whittlow, the application of a large bliſter, a burn, &c. is only conſidered as ſymptomatic. For moſt of our inflammatory diſeaſes are of a mixed nature, and not to be viewed in the ſimple light in which they have commonly been by medical writers. They are uſually excited by a proper febrile ſtimulus in the ſtomach and bowels, acting in conjunction with the inflammatory ſtate of the arterial ſyſtem. At the ſame time, it muſt be obſerved, that this febrile ſtimulus, which acts ſo powerfully on the ſyſtem, is not, in ſome reſpects, ſo ſtrongly marked, nor can its effects be ſo clearly traced in the inflammatory, as in fevers of the remittent or intermittent kind, which I hope ſhall be ſhown in a ſatisfactory manner, when we come to treat of theſe diſeaſes.

175. The circumſtances in a fever, which have always been the moſt difficult to explain,

plain, are thoſe which attend the acceſſion. For, as they are cloſely connected with the proximate cauſe, which is not ſufficiently underſtood, the ſymptoms depending on it cannot admit of any ſatisfactory ſolution, and have therefore been juſtly placed among the opprobria medicorum: Becauſe, from the manner in which theſe reſearches have been carried on, the cauſe of the ſymptoms has hitherto eluded the moſt diligent obſervation of thoſe learned and ingenious men, who have written on this ſubject. Even now, that our method of inquiry promiſes greater ſucceſs, it may not be in my power, in conſidering the circumſtances which may accompany the acceſſion or courſe of the fever, to give ſo full and ſatisfactory an explanation of them as I could wiſh. For, in a ſubject of ſo intricate a nature, there muſt be ſome particulars not ſo eaſy to be accounted for as others; not ſo much from a deficiency in the plan of inquiry, as from our ignorance of certain laws and regulations in the animal body, which

which, it is to be hoped, by the induſtry and obſervation of others, will, by degrees, become more known to us, when the nature, cauſes, and cure of fevers ſhall be proſecuted with greater advantage than at preſent. But, until farther diſcoveries are made, we ſhall proceed on ſuch facts and obſervations as I imagine will be allowed to be well founded.

176. Although an accidental expoſure to an intenſe cold, for any conſiderable time, is ſoon followed by a catarrh, catarrhal, or inflammatory fever; yet the effects of ſuch changes in the weather as are related in parag. 168. are commonly ſlow, and do not affect the health in any remarkable manner for ſome time. Becauſe it is not the cold of a few hours which affect people in general. It uſually requires the operation of ſome days before ſuch changes can be brought on the ſyſtem, as are mentioned in parag. 146. 147. and 148. On ſuch occaſions, its operation is continued as it were

by *priſes*, or ſucceſſive additions. It is not the cold of one day, but of ſeveral, that is capable of producing ſuch conſiderable effects on the arterial ſyſtem and mucous glands. Theſe, at firſt, are of a ſlight nature, but gradually increaſe according to the circumſtances of expoſure to the weather and conſtitution of the perſon, until a preternatural ſenſibility and irritability of the ſyſtem, which always accompany and keep pace with the morbid effects of cold, ariſe to ſuch a degree, as, in conjunction with the ſtimulus of a collection of phlegm in the ſtomach and bowels, from a diſeaſed ſecretion of it in theſe viſcera, an acceſſion of the fever is brought on. During the time that this morbid proceſs is advancing, ſuch changes are produced in the oeconomy as are taken notice of in parag. 174. But a particular time, which varies in different perſons, muſt elapſe before a febrile paroxyſm can be excited; becauſe a certain degree of morbid irritability muſt be induced to give the ſecreted fluids in the primae viae

that

that ſtrength of ſtimulus which is neceſſary for producing that effect. Theſe fluids act much in the ſame manner as other ſtimuli; that is, according to their quantity and acrimony, or the irritability of the ſyſtem. This irritability, at the commencement of the morbid diſpoſition, is little altered from its natural ſtate, and the body reſiſts, for ſome time, the ſtimulus ariſing from the diſeaſed ſecretions as above mentioned. But, as the irritability of the ſyſtem every day increaſes with the farther operation of the cold, the ſtomach, which is one of the moſt irritable organs, is firſt affected; and, from the general ſympathy of the body, with this viſcus, the various ſymptoms which precede, or attend the acceſſion of the fever, chiefly ariſe. At which time there appears to be an unequal and irregular diſtribution of the powers of action through the body, with a farther increaſe of the diſeaſed irritability of the whole ſyſtem. Certain ſympathies likewiſe take place, which are peculiar to that morbid condition

condition of the body. And as, on many other occaſions, there is an evident reciprocal ſympathy between the ſtomach and ſkin, this laſt is ſo affected by the febrile ſtimulus in the primae viae, as to ſuffer ſuch a conſiderable ſpaſmodic conſtriction, not only in its capillary veſſels, but through the whole of its ſubſtance, as produces a paleneſs on the ſurface of the body, a ſenſe of coldneſs, with horripulationes or rigors, which return at uncertain intervals. Theſe ſymptoms, according to their ſeverity, ſhow, in general, the magnitude of the future diſeaſe; for, in ſome ſlight caſes, they are ſcarcely to be perceived; during which time the pulſe becomes ſmall and quick, but is not attended with that irregularity which takes place in the cold ſtage of an intermittent.

177. This feeble ſtate of the circulation, as well as the wearineſs and laſſitude, nauſea, and ſometimes a vomiting about the acceſſion of the fever, and likewiſe that diminution

minution of ſtrength in the animal functions, ſo remarkable during the whole courſe of it, I ſhould imagine, would not be difficult to comprehend; for they are conſequences of ſuch a febrile ſtimulus as I have ſhown to exiſt previous to the commencement of fever acting in the primae viae: And, by ſympathy with theſe parts, the whole ſyſtem becomes extremely irritable. It is to this uncommon irritability of the ſtomach and bowels, that we muſt chiefly aſcribe the want of appetite, the great diſlike to all animal food, and to every thing that poſſeſſes any remarkable ſtimulus, except fruit; for which, and ſubacid diluent cold drinks, patients have the ſtrongeſt deſire *. For the ſame reaſon, a bright light, great noiſe, ſtrong ſmells, and ſimilar ſtimuli,

* This diſlike to animal food in fevers may likewiſe ariſe from an inſtinctive reluctance to every thing which would increaſe the putreſcency of the ingeſta; and, as acids are known to reſiſt putrefaction, the deſire for ſuch as are of a mild kind may alſo proceed from inſtinct.

muli, which were formerly borne with eaſe, and ſometimes with pleaſure, as in the uſe of tobacco, become exceedingly offenſive to them.

178. At firſt, the whole powers of action appear to be exerted in a weak and tumultuous manner, moſt of the functions being carried on with leſs firmneſs and regularity than in a healthy ſtate. The heart, in particular, is obſerved to ſuffer conſiderably, not only from the univerſally increaſed irritability of the ſyſtem, but from a remarkable diminution of its force. This debility appears to ariſe from the action of the febrile ſtimulus in the primae viae, which has ſo conſiderable an effect on the whole ſyſtem, and particularly on the vital organs, as, in the cold ſtage of ſome malignant intermittents, to put a ſtop to their motion altogether. This is no doubt a rare caſe; but, when it happens, we muſt ſuppoſe the febrile colluvies, from ſome remarkable noxious quality, to act on the ſtomach

ſtomach and bowels, and of courſe on the debilitated ſyſtem, as a poiſon, in producing theſe fatal effects. I know this enfeebled motion of the heart, on the acceſſion of a fever, is ſuppoſed to have ſome connection with the ſpaſmodic conſtriction of the ſkin, and it may in a ſmall degree be ſo. But this can only be underſtood in a ſecondary way; for the conſtriction itſelf, on the ſurface of the body, ſeems to originate from the febrile ſtimulus in the alimentary canal; and, when this ſtimulus has operated on the ſyſtem for ſome time, the ſpaſmodic conſtriction of the ſkin gradually leſſens, and ſoon after entirely diſappears; though, in ſome caſes, during the firſt day or two of the fever, a ſlight rigour occaſionally returns; but it rather reſembles an hyſterical chilline ſs, than a return of the cold ſtage.

179. As this febrile ſtimulus begins to abate, the action of the heart and vaſcular ſyſtem becomes gradually ſtronger, and is accompanied with a proportionable increaſe

of

of heat in the body, exciting the patient to uſe every means he can deviſe to carry off, or moderate its exceſs. But, how this tranſition from the cold to the hot ſtage happens, or what changes take place in the ſyſtem, which are capable of producing that effect, have hitherto been queſtions of difficult ſolution. From the view, however, we have taken of the nature and cauſe of a catarrh and catarrhal fever, it is to be preſumed that theſe effects will admit of ſome explanation, though it may not be, perhaps, in ſo full and ſatisfactory a manner as will afterwards appear, from conſidering the like phaenomenon in the bilious remittent and intermittent fevers. For there are certain circumſtances in theſe diſeaſes, which, I apprehend, will afford us an opportunity of diſcuſſing, in a more ample manner, this intricate part of our ſubject. I ſhall, therefore, at preſent, only remark, that, from the time the pulſe begins to quicken, there is a greater abſorption than uſual of the fluids from every cavity of the body.

body. This abſorption creates a thirſt and deſire for cool drink. But the abſorption and thirſt are not peculiar to a febrile quickneſs of pulſe, but are common to every accelerated circulation, whether from pain, exerciſe, external heat, or other cauſes. This frequent deſire for drink and dilution, ſo ſtrongly ſolicited by nature, continues through the whole courſe of this fever, appears to keep pace with the degree of it, and is accompanied with the moſt ſalutary effects, by retarding the putreſcency of the blood, which ſeems to increaſe with the accelerated circulation, and by ſupplying the place of the fluids abſorbed, and ſometimes carried off afterwards by perſpiration, reſpiration, the kidneys, and inteſtines. The abſorption and waſte of our fluids in fevers muſt be very great; becauſe the low diet, in ſuch ſituations, does not altogether account for ſo remarkable a diminution of bulk in the body, as is ſo often obſerved after a briſk fever of only a few days continuance. But there is another conſider-

able and important uſe derived from ſuch large draughts of thin liquors taken into the ſtomach, and for which the ſick in fevers are prompted by nature with ſo much avidity, I mean, the dilution of a preternatural quantity of phlegm from a morbid ſecretion of it in the primae viae, and which I have always conſidered as the principal febrile ſtimulus, and chief cauſe of thoſe rigours and chillineſs uſually felt at the commencement of a fever. This dilution facilitates the abſorption of the phlegm, which appears to be conſiderable on the acceſſion of the fever: Of courſe, its quantity in the ſtomach and bowels is ſoon leſſened; and, as this abſorption, as well as diminution of quantity, proceeds, the chillineſs, rigours, ſpaſmodic conſtriction, and paleneſs of the ſkin, gradually go off; becauſe, at laſt, there is not a ſufficient quantity of phlegm to continue theſe effects.

180. At this time the body becomes warmer, the pulſe harder, fuller, and ſtronger.

er. The ſkin recovers its natural colour, is ſometimes obſerved to be redder than uſual, but eſpecially that of the face, which often becomes florid, with other ſigns of a general plethora, to which the quantity of fluid abſorbed certainly contributes, though it chiefly ariſes from the increaſed force of the vaſcular ſyſtem. This, with a number of ſymptoms, which vary in different people, according to circumſtances, continue for an indeterminate time, or until the increaſed force of the heart and arteries, kept up by a perpetual irritability of the ſyſtem, from the effects of the cold, ceaſes, and the morbid ſecretion in the mucous glands returns to its natural healthy ſtate. But the time required by nature for accompliſhing theſe ends muſt differ with the conſtitution of the perſon, the magnitude of the diſeaſe, ſome peculiarity in the diſorder, and the manner of treating it. I know not if theſe fevers, when left to themſelves, and without any medical aſſiſtance, might not terminate in a certain time. But,

even

even in ſuch ſituations, I have never been able to obſerve that regularity in the critical days, ſo ſtrenuouſly inſiſted on by the ancients, and by many of the modern authors. This, however, I am certain of, that the period of a fever is ſhortened or protracted by a good or a bad practice.

181. I know it is a general opinion, that the cold ſtage, on the acceſſion of a fever, is eſſential to it, and, by ſome, it is conſidered as the cauſe of every fever whatſoever. But, from the view we have taken of the nature of a catarrhal fever, the coldneſs and rigours at the commencement of it muſt be conſidered as an effect of the proximate cauſe, acting in the primae viae on the ſyſtem, which is rendered, in an extreme degree, irritable, from the antecedent action of the remote cauſe. Neither am I clear, that a cold ſtage is eſſential to this ſpecies of diſeaſes. For although it does, in a greater or leſs degree, accompany the attack of the greateſt number of

fevers,

fevers, yet there are inſtances of their coming on without any rigour or chilline ſs. But theſe diſorders are generally of a mild nature, and uſually terminate in the recovery of the perſon. Beſides, how often does it happen to people afflicted with an ague, that they eſcape the cold fit altogether, which cannot be explained on the ſuppoſition of its being eſſential, and far leſs as the cauſe of the diſeaſe? But, it may be ſaid, that a ſpaſm on the ſurface of the body is ſufficient of itſelf to conſtitute the proximate cauſe, independent of any ſenſe of coldneſs or ſhivering; and, if this were the truth, one might naturally ſuppoſe a diminution of perſpiration to be the conſequence, which is by no means the caſe; for, profuſe ſweats, and the waſteing of the body, contradict the hypotheſis. Another circumſtance invalidates this theory. If effects are proportioned to their cauſes, how comes it about, that the longeſt and moſt ſevere cold fit does not produce the longeſt and moſt obſtinate hot ſtage? Though this

frequently

frequently happens, yet it is not always the caſe. I have often obſerved fevers proceed a conſiderable length where the rigours and chillineſs at the beginning were little more than thoſe obſerved occaſionally through the courſe of the diſeaſe, from an accumulation of phlegm or bile in the primae viae which ſometimes occaſions an increaſe of the fever for a few hours. This phlegm acts on the ſyſtem nearly in the ſame manner as at the commencement of the fever, but, in general, with leſs force; and which phlegm, I believe to be the real cauſe of thoſe exacerbations and remiſſions which are ſo common in almoſt every ſpecies of fever. For, till the preternatural irritability of the body and the morbid ſecretions in the alimentary canal are rectified, the ſick muſt be ſubjected to thoſe remarkable changes in the ſtate of the fever from every accumulation of bile, phlegm, and other acrid matter in the ſtomach and bowels. Improper drink or food will produce the ſame effect, from the great irritability of the

nerves

nerves of theſe viſcera, which, at ſuch times, cannot even bear the ſtimulus of the ordinary ingeſta, without an increaſe of the fever, and raiſing other diſturbances in the oeconomy. Sometimes a vomiting and purging is brought on, which, when conducted in a proper manner, give great relief to the patient.

182. But here a difficult queſtion ariſes with regard to the regular acceſſion of the fever at night, and the remiſſion of it in the morning, which I wiſh it was in my power to ſolve. But, from our limited knowledge in the laws of the animal oeconomy, I deſpair of being able to give a full explanation of this intricate point. I ſhall, however, hazard a conjecture. In the firſt place, it muſt be remarked, that this accelerated circulation is not peculiar to a febrile condition of the body; for the ſame thing is obſerved to take place, in a leſs degree, in health. This is probably owing to an increaſed irritability of the ſyſtem,

ſtem, occaſioned by the continued exertion of our functions, and of the faculties of the mind through the day. For mental exertions, when carried to any uncommon degree, though the perſon ſhould not move from his chair, never fails to quicken the pulſe. This exertion of mind and body muſt be inconſiderable during a fever, but, from the debilitated ſtate of the body, will have a proportionally greater effect in increaſing the irritability of the ſyſtem. Another circumſtance which may contribute to this regular acceſſion of the fever in the evening, is the remarkable diminution of perſpiration which takes place at that time, and continues through the night. This fact is confirmed by the experiments of Sanctorius and Dr Keil. The laſt of theſe learned gentlemen, in his aphoriſms, ſays, 'Perſpiratio diurna eſt nocturnae ſeſquial-'tera.' Is it not, therefore, reaſonable to ſuppoſe, that, in proportion to the diminution of perſpiration, a degree of fever may ariſe, which, perhaps, receives ſome addi-

tional

tional ſtrength from an augmentation of the febrile ſtimulus in the primae viae. This increaſed force of the fever, after a few hours continuance, commonly abates in the morning with a more free and copious perſpiration. In as far as this acceſſion in the evening may depend on its ordinary cauſe, it is ſeldom conſiderable. But an additional quickneſs of pulſe, at ſuch times, is always perceptible through the whole courſe of the fever.

183. There is ſuch a ſimilarity between a ſevere cold and a ſlight catarrhal fever, that it is difficult to draw an exact line of diſtinction; for they ariſe from the action of the ſame remote cauſe, and the ſame, or ſimilar parts are affected. In both diſeaſes, the vaſcular ſyſtem and mucous glands are the parts chiefly attacked. But a catarrh is generally the effect of a ſudden application of cold, (parag. 147.) ſometimes only for a few minutes. With the exceptions mentioned in parag. 153. cold commonly

affects the internal membrane of the bronchi, the tonsils, fauces, and nose, but seldom the glands of the stomach till the patient has been ill for some time, when the cough usually increases; but it is much abated on the expulsion of a quantity of phlegm by an emetic. During this time, or, at least, from the third or fourth day of the disorder, there is hardly any fever; for, about that period, the preternatural irritability of the body, in a great measure, goes off, and, of course, such a quantity of phlegm in the stomach, as might prove a febrile stimulus in a more irritable state of the system, has not the least effect. But if, at that time, the patient shall catch a fresh cold, be seized with a severe continued pain in any part of his body, or, from some other cause, his system becomes uncommonly irritable, then such a collection of phlegm in the primae viae usually brings on a feverish paroxism. The catarrh then puts on the form of a cattarhal fever of an uncertain duration. But, when this takes

place,

place, without a cough, ſore throat, or any other of thoſe topical affections commonly called catarrhal ſymptoms, then the diſeaſe, in general, receives the name of a continued fever. However, from this evident affinity between theſe two diſorders, the indications of cure muſt be nearly the ſame, though the management in ſuch a fever, according to the variety of the ſymptoms, ought to be ſomewhat different, and conducted with the utmoſt attention. But, as the morbid effects of the cold and moiſt weather in autumn 1758 were various, in different perſons, thoſe diſeaſes which aroſe from it, and were not ſtrictly catarrhal, as agues, diarrhoeas, the gout, rheumatiſm, &c. required each a particular treatment, ſuited to the nature of the diſeaſe. I ſhall now proceed to conſider the curative indications of the catarrhal or continued fever, in the order in which they are mentioned in paragraphs 161. 162. 163. and 164. with ſuch other remarks and obſervations as ſhall occur from a conſideration of the

different

different ſymptoms which ſometimes accompany the various forms of this diſeaſe.

184. Nature often points out the means to be uſed for anſwering our firſt intention, namely, that of moderating the force of the circulation, and taking off that tendency to inflammation which ſo uniformly accompanies every diſeaſe of this kind; for a perſon is no ſooner attacked with the fever, than he feels a deſire of going to bed, where, by an eaſy horizontal poſture, he leſſens the ſtimulus on the vaſcular ſyſtem, which ariſes from the action of ſuch a number of muſcles as muſt be employed in an erect poſition of the body: But, in whatever direction he may lay himſelf, particular muſcles, by being kept in conſtant action, ſoon become tired, and the patient ſeeks for a new poſture to give relief to his wearied muſcles; the ſame wearineſs recurs in a few minutes, and gives riſe to that remarkable reſtleſſneſs which takes place in fevers. I have already taken notice

tice of the incapacity of the ſick (177.) to endure any great noiſe, bright light, ſtrong ſmell, animal food, or whatever ſtimulates their ſyſtem, which the diſeaſe has rendered extremely irritable. All ſtimuli of this kind they avoid in the moſt ſolicitous manner, from a conſciouſneſs of their having a tendency to increaſe their diſorder; but an ardent deſire of drink and dilution, which has ſo conſiderable a ſhare in the cure of fevers, is kept up through the whole courſe of their illneſs. They have likewiſe the ſtrongeſt deſire for ripe fruits and ſubacid liquors. This is one of thoſe natural appetites beſtowed on us for anſwering ſome valuable purpoſe in the oeconomy, which, in the preſent caſe, is not only the correction of a putrid colluvies in the primae viae, but an abatement of the putreſcency of the blood that every day increaſes: For, whatever may be the nature of the fever at firſt, it ſeldom fails, in ſix or eight days, to ſhow its putrid diſpoſition, by a variety of ſymptoms.

185.

185. To anſwer the ſame intention, and to moderate the exceſs of heat and its conſequences, the ſick are equally deſirous of cool freſh air, cold drink, and light bedclothes, unleſs they are forced into a contrary practice by an ill-judged ſolicitude of their friends to keep them warm, though they are tormented with a degree of heat conſiderably above the ſtandard, the reduction of which is always attended with the moſt ſalutary effects: Of this we have the cleareſt evidence in the ſmall pox, and in every fever accompanied with great heat and a quick circulation. But the application of the cold muſt not be carried ſo far as to diminiſh the powers of action in too great a degree, of which there is very little hazard; for the patient himſelf, if free from delirium, will always, from his feelings, prevent any miſtake of that kind. This is the antiphlogiſtic method of cure dictated in ſuch ſtrong and pathetic expreſſions by nature, in every inflammatory fever, and ought to be followed ſtrictly by

us,

us, unleſs in caſes of debility in the more advanced ſtage of the diſeaſe, when cordials, ſtimulants, and antiſpaſmodics, are exhibited with advantage.

186. When the above plan of cure proves inſufficient for moderating the exceſs of heat, and violence of the circulation, phyſicians have recourſe to other methods of accompliſhing theſe ends. The firſt is to leſſen the plethora by veneſection, which is alſo the moſt efficacious in diminiſhing the powers of action, and eſpecially thoſe of the heart and arteries. But it requires experience to judge how far bleeding may be carried with advantage, or even with ſafety to the patient. We do not ſay that a fever is high, when the pulſe beats not more than 25 or 30 ſtrokes in a minute above its uſual number. At the ſame time, when we judge of the degree of fever, we ſhould conſider the age and ſex of the patient, the conſtitution, the febrile ſymptoms, the fulneſs, hardneſs, or ſtrength of the pulſe,

pulſe, and the time of the diſeaſe, before we can direct the quantity of blood to be taken, or the repetition of the operation. Bleeding may be performed more freely in plethoric habits, eſpecially when accompanied with ſpitting of blood, bleeding at the noſe, violent coughs, ſore throats, or other topical inflammations, and particularly of the pleura, or lungs, than when the fever is not attended with any of theſe ſymptoms. It frequently happens, in practice, that a plethoric perſon, with a pulſe only at 90, is bled freely, with the greateſt propriety and advantage, whilſt in another, under the ſame ſpecies of fever, having a pulſe at 110 beats in a minute, but of a contrary conſtitution, veneſection is forbid with equal judgment and benefit. Hence it is eaſy to perceive the impoſſibility of fixing preciſe rules for our conduct in this particular, the circumſtances mentioned being the only means to direct our judgment in certain caſes. But, it may be obſerved, in general, that no perſon in a catarrhal

tarrhal fever, with a ſtrong and full pulſe above 110 beats in a minute, is ever the worſe for one bleeding, from 10 to 12 ounces; nay, we conſider it as a neceſſary and ſafe practice on ſuch occaſions, which we are obliged ſometimes to repeat, eſpecially when any topical inflammation appears. In which caſe, we endeavour to aſſiſt the general effects of veneſection by topical bleeding with leeches, or wet cupping, fomentations, embrocations, and bliſters; which laſt ought to be applied as near to the part affected as poſſible, and rather above than below the ordinary ſize; becauſe, from experience, bliſtering is found, next to bloodletting, to be the moſt effectual means of removing topical inflammation, (parag. 163.) and often ſuperſedes the neceſſity of large and repeated bleedings, which, when carried too far, produce conſiderable debility, (parag. 14. 15. and 34.) and ſometimes lay the foundation of dropſies, and other chronic diſeaſes.

187. So far our plan of recovery appears exactly to correſpond with the account we have given of the nature and cauſe of the diſeaſe. But, as I have ſpoken ſo often of a febrile ſtimulus, from a morbid ſecretion in the mucous glands of the ſtomach and bowels, it is natural to ſuppoſe, that the clearing theſe viſcera, by a gentle emetic and cathartic, ſhould alleviate the ſymptoms, and, in moſt caſes, leſſen the degree of fever, which, during many years practice, I have, in general, found to be followed by theſe good effects, eſpecially when adminiſtered about the beginning of the diſorder. It is in this way we muſt account for the ſalutary conſequences of the exhibition of antimonials, under the names of tartar emetic, calx antimonii nitrata, Kermes mineral, James's powder, &c. All of theſe may be managed in ſuch a manner, as to have nearly the ſame effects in exciting vomiting, producing ſtools, and raiſing a gentle diaphoreſis, which operations, after veneſection, have often carried off the

fever

fever in a very ſhort time, and have given riſe to thoſe numerous encomiums on James's powders, as a ſpecific in fevers, with which the public has been amuſed for ſo many years. The good effects of theſe powders have gained them great credit with the world, without its being perceived, in general, on what their febrifuge virtues depended. I mean not to ſay, that every thing which will vomit, purge, and increaſe perſpiration, will always be attended with the ſame good effects; for the above antimonials, when properly prepared, and given with judgment, appear to poſſeſs a peculiar ſtimulus which adapts them better for producing theſe ends than moſt other medicines. At the ſame time, the favourable opinion I have of their general uſe in fevers, does not preclude me from that variety in preſcribing which different circumſtances muſt dictate in particular caſes.

188. The remarkable ſucceſs derived from the active preparations of antimony

in

in fevers, has created a general idea that they poſſeſſed a power of acting on the cauſe of the diſeaſe in ſuch a manner as to counteract its operation, or to deſtroy its force altogether; which they certainly have not in any other way than is mentioned in the preceding paragraph. The ſucceſs that has attended the proper exhibition of theſe powders, at the commencement of ſlight febrile diſorders, has greatly contributed to promote this univerſal belief. For, although moſt of ſuch caſes uſually terminate in the recovery of the patient, in the courſe of two or three days, without any other aſſiſtance than reſt and dilution, yet the antimonial preparation being given in ſuch a manner as to excite vomiting, purging, or both, and afterwards, from what remains of it in the bowels, ſuch an aegritudo is kept up in the primae viae as to produce a diaphoreſis, it ſeldom fails of ſhortening the period of the diſeaſe. Becauſe, in ſuch mild caſes, if the alimentary canal is cleared in the manner mentioned, a gentle perſpi-

ration

ration after ſuch evacuations, aſſiſts moſt remarkably in carrying off the morbid affection in the glands of the ſtomach and bowels, and conſequently the fever itſelf. But, if the cauſe of the diſeaſe ſhall have operated ſo ſtrongly on the ſyſtem, as not to be removed by ſuch gentle means, the fever will, notwithſtanding, proceed for an indeterminate time, though the antimonials may have been given, ſo as to have produced the above effects. In ſuch caſes, the repetition of them is, for the moſt part, attended with bad conſequences. For, as our principal view in the exhibition of ſuch medicines is, to evacuate the ſtomach and bowels of a collection of phlegm, and other acrid matters, if the fever ſhall continue after this end has been obtained, perſiſting in the uſe of ſuch ſtimulating remedies commonly produces debility, and other conſiderable diſturbances in the ſyſtem, which I have ſometimes known to have been carried ſo far as to endanger the life of the patient. At the ſame time, it muſt

be

be obſerved, that antimonials may be given at any period of the fever with the greateſt advantage, when the patient has ſtrength ſufficient to bear their operation, and when there is a quantity of phlegm, acrid bile, and faeces, in the primae viae, which, from their ſtimulus, and putreſcent nature, produce ſo much miſchief in fevers. The neglecting to evacuate the firſt paſſages of a putrid colluvies, has given ſuch frequent occaſion to beſtow the higheſt praiſes on the virtues of James's powders; becauſe they often produce thoſe ſalutary effects, at a time when nature was diſpoſed to critical evacuations, but was impeded in her operations, from the diſturbance raiſed in the ſyſtem by the putrid fomes in the alimentary canal.

189. As it would here, perhaps, be premature to enter more particularly into the ſubject of the active preparations of antimony, I ſhall reſerve any farther obſervations on this head till we ſhall have conſidered

ſidered the cure of bilious fevers, thoſe ariſing from marſh effluvia, and others of a ſimilar nature, where antimonials are of more general utility, than in thoſe of a catarrhal or inflammatory diſpoſition. For, in theſe laſt, the exhibition of antimonials is more limited in the hands of thoſe who know how to uſe them with propriety, which is ſeldom above once or twice during the courſe of the diſeaſe. Becauſe, in fevers of the inflammatory kind, the primae viae are not ſo apt to be loaded with acrid ſubſtances as in fevers of a more putrid nature; and, of courſe, there is ſeldom any neceſſity for giving ſuch remedies to evacuate the inteſtines. We, in general, find laxative glyſters of ſufficient efficacy for that purpoſe, through the whole courſe of the diſeaſe, except at its commencement, when, in particular caſes, a doſe of Glauber or Rochelle ſalts is given with advantage; and, if ſymptoms ſhall indicate any diſorder in the ſtomach, from phlegm, bile, or indigeſted food, the adding a grain or

two

two of tartar emetic to ſuch ſolutions, and giving them in ſmall doſes, at proper intervals, ſo as to excite gentle vomiting and purging, is followed with conſiderable benefit to the patient, by alleviating the ſymptoms, and moderating the degree of fever. But, ſuch a medicine can, in few inſtances, be repeated with equal advantage, eſpecially in ſuch caſes as appear to be highly inflammatory, or where topical inflammation has already taken place; for, on theſe occaſions, ſuch ſtimulating medicines are apt to increaſe the diſorder. Neither is their operation as antimonials, at ſuch times, ſo much wanted; becauſe, from the conſiderable dilution and abſorption which take place during an accelerated circulation, there muſt be a proportionable diminution of phlegm in the firſt paſſages. Hence we rather chooſe to conduct the remaining part of the cure by the means mentioned in paragraphs 161.—164. giving, at the ſame time, neutral ſalts of various kinds, as the ſaline mixtures, made with the fixed or volatile

volatile alkalis, nitre, cream of tartar, and others, which poſſeſs cooling and ſedative powers, or which promote perſpiration and urine, without heating the patient, or exciting any remarkable diſturbance in the ſtomach and bowels.

190. But, in a variety of caſes, much will depend on the judgment of the phyſician, who, from his experience, will ſeldom be at a loſs in the management of his patient under particular complaints, whilſt he keeps in view the original cauſe and nature of the fever, guarding as much as poſſible againſt a ſtate of debility, which generally takes place towards the end of the diſeaſe; and, when it has been protracted to any conſiderable length, often gives evident ſigns of its putreſcent diſpoſition, which it did not at firſt. At this period of the diſorder, Peruvian bark, cordial ſtimulating remedies, antiſpaſmodics, and wine, may be given occaſionally, which could not be done in the more early ſtages

of the fever. With the ſame view of keeping up the vis vitae, and preventing the fatal termination of the diſorder, from mere debility and a ſluggiſhneſs in the powers of action, we are often obliged to have recourſe to external ſtimulant applications, in the form of cataplaſms, to the feet, and bliſters to different parts of the body, which laſt are ſuppoſed, by practitioners, to have other beneficial conſequences as evacuants; and, in caſes of topical affections, they may likewiſe have their uſe. But their good effects, as general evacuants in caſes of debility, I ſuſpect are not ſufficiently aſcertained. However, in ſuch debilitated ſtates of the body, we are obliged to ſupport the ſtrength of the patient as much as poſſible by proper aliment, in ſmall quantities, frequently repeated, with wine and other cordials, until the criſis or termination of the fever, which is for the moſt part accompanied with ſome ſenſible evacuation by the ſkin, kidneys, or inteſtines,

inteſtines, and ſometimes by the whole of theſe emunctories.

191. The criſis of a fever is perhaps the moſt remarkable phaenomenon in the whole courſe of the diſeaſe. To this circumſtance we look forward with the utmoſt ſolicitude as an operation of nature, by which we expect a ſolution of the diſorder; the fever itſelf being conſidered only as preparatory to it, and as the ſtate of coction or maturation of the materies morbi, fitting it to be thrown out of the body in the manner mentioned, or by exanthemata, puſtules, boils, impoſthumes, or other critical diſcharges.

192. Although it is highly probable that, in every ſpecies of fever, there is a materies morbi, yet I imagine it is chiefly generated in the courſe of the diſeaſe; for, in infectious diſorders, the quantity of matter capable of producing diſeaſes, ſimilar to thoſe from which they took their origin,

is inconceivably ſmall; but the products of them, in the courſe of the diſeaſe, are exceedingly great. However, as infectious diſeaſes are attended with ſome peculiar circumſtances, we ſhall poſtpone the conſideration of the changes brought on our fluids, and the maturation of the morbific matter during the courſe of theſe fevers, till we come to treat of the diſeaſes themſelves. At preſent, we ſhall only conſider ſome circumſtances that occur in the courſe of every catarrhal fever, which may perhaps lead us to a more juſt conception of the materies morbi, and likewiſe convey ſome idea of the manner in which a criſis and critical diſcharges take place towards the decline of the diſeaſe.

193. The chief circumſtances which excite our attention, at the commencement of a continued fever, are the uncommon quickneſs and ſtrength of the pulſe, with a preternatural heat of the body, a conſtant concomitant of an increaſed velocity of the blood,

blood, which, when continued for any conſiderable time, never fails to produce a morbid change in the circulating fluids, and in ſome of the ſecretions, particularly of the bile: For that animal proceſs, by which the chyle is aſſimilated or changed into blood, is always promoted by ſuch an accelerated circulation. This naturally produces an uncommon putreſcency in the fluids, which is conſtantly accompanied with ſome degree of acrimony. Beſides, this additional proportion of heat, when long continued, has a remarkable effect on the ſecretion of the bile, which becomes more acrid, and greater in quantity, than in a healthy ſtate. This effect is not ſo perceptible in a catarrhal fever as in the bilious kinds, where the principal remote cauſe is an exceſs of heat. The fact is, that, after an abatement of the inflammatory ſymptoms, if the fever continues, it never fails to ſhow more of a putrid diſpoſition than it did at firſt, and this is always in proportion to the duration of the diſeaſe.

But

But there is another ſource of acrimony in the blood, occaſioned by an abſorption of acrid humours in the alimentary canal, ariſing from the morbid ſecretions of the mucous and other glands, from which I have always ſuppoſed the febrile ſtimulus chiefly to ariſe, and it is moſt likely does continue to act more or leſs in that way during the continuance of the fever; from which abſorption, as well as from the uncommon velocity of the blood, and perhaps other cauſes, the putreſcency and acrimony of our fluids are daily increaſed, from which, what may be called the materies morbi probably derives its origin, though it is by no means the cauſe of it. On the contrary, it appears to be the product of the diſeaſe, notwithſtanding it adds conſiderably to the magnitude and danger of the diſorder. It is highly probable that a conſiderable waſte of the materies morbi takes place during the courſe of the fever, by perſpiration, urine, and the inteſtines. But it does not appear that it is completely

evacuated

evacuated till the criſis. I mean not, that the whole is thrown out of the body at the criſis; for the perſon may be in a convaleſcent ſtate for ſome weeks before he can be ſaid to be entirely free from the diſeaſe; during which time the morbid matter often proves the cauſe of boils and impoſthumes. When theſe take place on the ſurface of the body, their uſual ſeat, they are ſuppoſed to be ſalutary evacuations. I am aware that it may be aſked, what is a criſis, and how does it happen? To theſe and ſimilar queſtions we ſhould perhaps plead ignorance. But, that I may not be accuſed of that indolence or want of courage of which I have accuſed others, I ſhall proceed to conſider what I imagine happens in the decline of fevers.

194. It requires no ſtretch of imagination to ſuppoſe, that the cauſes of fevers, in general, will act on the ſyſtem with a degree of force proportioned to their power, and the ſtrength of the perſon to reſiſt their

effects.

effects. And, indeed, we find fevers of every ſpecies varying in their violence and duration, according to the circumſtances juſt mentioned. It is true, that certain ſpecific contagious fevers are leſs liable to vary in the time of their continuance previous to the criſis, as the meaſles, ſmall-pox, &c. But, between the mild and malignant ſorts, we perceive a difference, even of ſome days, before they can be ſaid to be at their height; and eſpecially in the ſmall-pox; for the meaſles are more regular as to their time of duration, as far as reſpects the growth, number, and brightneſs of the exanthemata, which generally decline about the fifth day, though danger from the fever is, in many caſes, not over for ſome time afterwards. Theſe differences are generally foreſeen by practical phyſicians from the third or fourth day of the diſeaſe. But, in a catarrhal or continued fever, the time antecedent to the criſis is, and neceſſarily muſt be, exceedingly various. For it is not reaſonable to ſuppoſe, that the duration and danger of

the

the fever will be otherwiſe, than in proportion to the force with which the remote cauſe has acted in the production of ſuch morbid conditions of the body as have proved the immediate cauſe of the diſeaſe. Or, if we take another view of this important ſubject, and ſay, that this fever being an operation of nature, by which ſhe endeavours to rectify the effects of the remote cauſe, then we muſt alſo ſay, that this operation, with regard to its force and continuance, will always be in proportion to the morbid conditions of the body it is calculated to remove. But, if theſe ſhall be found, at the ſame time, to be the principal ſource from which the fever derives its origin, then they muſt neceſſarily keep pace with one another. The fact is, that we find catarrhal fevers terminating on the 3d, 4th, 5th, and 6th day from their commencement, and ſometimes continuing for a much longer period, without any regularity as to critical days, ſo as to ſettle that diſputed point with any degree of preciſion. With

regard to the morbific matter we have mentioned, the same way of reasoning may also be applied to it; because, according to the degree of fever, will be the quantity and time necessary for fitting it to be thrown out from the circulating fluids, as is evidently the case in other fevers. For in some mild kinds of the inoculated small-pox, I have known the pustules appear on the fifth or sixth day from the inoculation, with a degree of fever scarcely perceptible, and they have turned on the 6th, 7th, or 8th, seldom continuing out full till the 9th day, the usual period of the natural distinct kind. But in the more malignant sorts, we know that they do not arrive at their height till the 11th, 12th, 13th, or 14th day, from the first appearance of the pustules. What probably assists the evacuation of the morbific matter at the time of the crisis by the usual emunctories is, that, from a preternatural irritability of the whole system during the course of the fever, and likewise from an increased acrimony in the fluids,

there

there is a certain tenſion kept up on the ſecretory veſſels, as well as on thoſe of a larger kind, which I conſider as a different affection from what is properly called ſpaſm; becauſe the veſſels ſtill continue to be pervious, and to perform their functions, though, perhaps, they are leſſened in their diameters. But at the time of the criſis, the cauſe of the diſeaſe abating in its force, and at laſt ceaſing to act altogether, the preternatural irritability of the ſyſtem being, at the ſame time, conſiderably leſſened, the general tenſion of the veſſels is taken off, and the ſecretory organs act more in their natural way.

195. Our obſervations on the urine of people in fevers are chiefly directed to the ſtate of maturation of the morbific matter, and the time of the expected criſis. We are led to judge of theſe circumſtances, from clouds in the urine hanging towards the bottom, after the glaſs has ſtood for ſome hours. This appears to be a ſecretion of

part

part of that acrid matter generated in the courſe of the fever, which, at this time, is moſt probably facilitated by ſome abatement in the force of the cauſe of the diſeaſe, and, conſequently, of the general tenſion on the vaſcular ſyſtem, particularly of the ſecretory veſſels of the ſkin, kidneys, and inteſtines. However, when theſe clouds or flocculi appear, they always give ſome hope of an approaching criſis. But, in this, we are ſometimes diſappointed, from the urine becoming next day clear again, which may be owing to ſome accidental impediment to the regular progreſs of that natural operation by which a ſolution of the fever is brought about. For, on a farther advancement of the diſeaſe, in thoſe caſes which terminate favourably, the clouds return, and, in a little time, the criſis comes on. When this ripening proceſs, as it may be called, is complete, or nearly ſo, there is a conſiderable evacuation of the concocted matter, by perſpiration, urine, and the inteſtines,

inteſtines, though we have no means of obſerving it but by its ſalutary conſequences, except in the urine, by which there appears to be a large ſecretion of it, from its ſubſiding in conſiderable quantity, in the form of a ſoft, whitiſh, ſediment. But, in ſuch caſes as are, from the violence of the diſeaſe, incurable, though clouds may ſometimes be ſeen in the urine, yet, as there is no regular criſis, it very ſeldom happens that there is ſeen, before death, that diſtinct depoſition of matter ſo uniformly obſerved in the ſalutary criſis.

196. It is certainly the duty of every perſon who publiſhes a new theory on any ſubject, to proceed with the utmoſt caution and candour in relating thoſe facts and obſervations on which his doctrine is to be eſtabliſhed. Becauſe, the want of a proper circumſpection is apt to draw him into inaccuracies, and even errors, which, becoming afterwards the ſubject of criticiſm, diſcredit his writings. It is a fear of incurring

curring the cenſure of the public that has kept me from treating the catarrhal fever in ſo copious a manner as might have been expected. Becauſe, ſuch additional evidence and arguments as might have been brought in ſupport of the explanations I have given of the nature of the remote and proximate cauſe, and of their operation on the ſyſtem, on which depend, in a great meaſure, the rationale of the ſymptoms, will be better underſtood when we come to conſider them more particularly in the hiſtory of other fevers. For, though there are certain circumſtances and ſymptoms common to all fevers, yet, every different ſpecies has ſymptoms peculiar to itſelf, ſometimes called pathognomonic; and it is from a particular conſideration of theſe only that we can be enabled to trace the ſingularity of the ſpecies, in what it differs from the other kinds, and muſt lead us into a more diſtinct knowledge of the general theory of fevers, as well as to that of

each

each particular ſpecies. Therefore, having taken the above view of the effects of an exceſs of cold on the human body, in the production of diſeaſes of an inflammatory tendency, we ſhall next proceed to conſider ſome of the effects of an exceſs of heat; and, firſt, of the Cholera Morbus.

SECTION

SECTION VII.

OF THE CHOLERA.

197. IN ſection third, I endeavoured to take a view of the effects of an exceſs of heat, applied to the human body, by which certain operations are excited in the ſyſtem, tending to obviate theſe effects, and to regulate the ſtandard heat, on which the powers of action, in a great meaſure, depend. There I confined my obſervations chiefly to the circumſtances juſt mentioned, reſerving the conſideration of the other effects of an exceſs of heat, in the production of morbid conditions of the body, till we ſhould come to treat of the diſeaſes ariſing from them; amongſt which, the cholera, being

being more extenſive in its influence, in laying the foundation of other diſorders, than the reſt, merits our firſt attention.

198. Moſt authors who have written on the ſubject of the cholera, have allowed it, in this country, to be the product of the heat in ſummer, which muſt, no doubt, be conſidered as the remote cauſe of this diſeaſe. For, although we ſometimes have a caſe or two in the months of June and July, in particular conſtitutions, more readily affected by heat than others, yet, it is not till the month of Auguſt, or till the ſummer heat has had its full influence in prediſpoſing the body to this diſorder, that it can be ſaid to be frequent. It often goes on, in a leſs degree, through the month of September, but uſually abates in its violence and frequency on the ſetting in of the cold weather in October. It is not a diſeaſe of winter, or of the cold weather in the ſpring, except as it were by accident, in particular perſons, conſtitutionally, or from former

attacks of bilious complaints, diſpoſed to larger ſecretions of bile than uſual, which propenſity to this diſeaſe is ſometimes increaſed by full diet and living freely, in reſpect to vinous liquors.

199. In the conſideration of the remote cauſes of diſeaſes, it is of more conſequence to the practical phyſician to have the facts relative to them eſtabliſhed, than to receive the beſt theory that can be given with regard to their manner of operating on the ſyſtem. I ſhall, therefore, on that part of my ſubject, proceed no farther than to enumerate thoſe effects of an exceſs of heat applied to the body, as are known, in general, to be the natural conſequences of it. Nor is there much reaſon to be very ſolicitous on this head, ſince the fact, that a cholera is the effect of heat, is eſtabliſhed by the conſent of all medical writers and practitioners who have attentively conſidered the ſubject.

200.

200. The effects of heat, in the production of cholera, is by no means ſo remarkable in this country as in the warm climates, where it is a common diſeaſe in all ſeaſons of the year, but eſpecially towards the autumnal months. Strangers from Europe, in the Eaſt or Weſt Indies, are more readily affected with this diſeaſe, and others of a bilious nature, than the natives; for, till nature is accuſtomed to this extraordinary warmth, and is brought by habit to accommodate herſelf to the climate, the uncommon heat to which ſuch perſons are expoſed, muſt have a more powerful effect on their bodies than it can have on thoſe who are more inured to it. Immediately on the arrival of ſtrangers within the tropics, their circulation becomes quicker, their perſpiration freer; a laſſitude or debility takes place, partly perhaps from the particular ſtimulus of the heat itſelf, but chiefly from the uncommon expence of the powers of action, in preſerving the ſtandard point of heat. Their ſyſtem comes

ſoon to be endowed with a preternatural irritability, which appears more evident in the courſe of diſeaſes, eſpecially thoſe that are known to originate from the climate; for every medical practitioner in thoſe countries remarks, that the ſick do not bear above half the doſe of ſtimulating remedies that can be given in Europe to people of ſimilar conſtitutions. Nay, this irritability in time extends to the mind itſelf, but eſpecially to the children of Europeans, who have been born and brought up in theſe warm regions: For the warmth of temper, the keenneſs of paſſions, the impatience of controul, ſo characteriſtic of the generous inhabitants of warm climates, muſt not be attributed ſolely to the manner in which they are educated, but partly to the heat of the country, which has ſuch influence on the mind, as has been more fully treated of in Section Third.

201. Theſe circumſtances of an accelerated circulation, increaſed perſpiration, debility,

debility, and preternatural irritability, are the moſt obvious effects of an exceſs of heat; and, when the heat ariſes from the nature of the climate, it muſt act with unremitting influence, in producing conſiderable changes in the body. It is highly probable, that a greater putreſcency than uſual is thereby brought on the circulating fluids; and, in fact, we ſee that the diſeaſes of warm climates have more of a putreſcent tendency than thoſe of the ſame kind in colder regions. But, whether this diſpoſition in the blood contributes to a larger ſecretion of bile than ordinary, cannot be determined with preciſion, though we are certain, from daily experience, that the long continuance of a warm atmoſphere produces larger ſecretions of bile than common; and, perhaps, it is more and more acrid as the ſecretion, in point of quantity, deviates from its natural ſtate. But we cannot be altogether certain of this fact; for I ſuſpect, that the great acrimony which the bile acquires is during the time it ſtagnates

nates in the bowels, where it accumulates by degrees, and ſometimes to a conſiderable quantity, before it gives any remarkable diſturbance to the patient; but at laſt, from its bulk and increaſed acrimony, a vomiting and purging are excited, accompanied with ſickneſs, pains in the bowels, and a conſiderable proſtration of ſtrength. When this diſorder is ſevere, or the ſyſtem remarkably irritable, it is often attended with cramps in the abdominal muſcles, the limbs, and other parts. Theſe complaints continue for a longer or ſhorter time, according to the quantity of bile, its acrimony, and the morbid ſtate of the ſecretion in the liver. A great deal depends on this laſt circumſtance, particularly in warm latitudes, where it is often in a more diſeaſed condition.

202. From this view of the nature and cauſe of the cholera, it is eaſy to perceive why the warmeſt ſummers or climates ſhould produce the moſt conſiderable effects;

fects; and why such people, whose circulation is much accelerated by hard labour in the field, and soldiers in their encampments, from their being more constantly exposed to the heat of the sun, and to considerable fatigue in the discharge of their duty, should be more subjected to severe attacks of this disease * than others living in towns and villages, where they are less exposed to the heat of the atmosphere, and live more at their ease. It sometimes happens in the month of August, that the mornings and evenings become cold, or that we have a few days of cold and rainy weather,

* 'Soldiers in a camp suffer a great deal from heat, 'by being constantly exposed to the sun, either without any shade at all, or only sheltered by a thin 'tent; and, where the air being so much confined, 'the heat is often more insupportable than without, in 'the sun. This circumstance, joined to the damps of 'a camp, is the cause that the summer and autumnal 'diseases of an army, even in a northern latitude, re-'semble so much the epidemics of southern countries, 'especially of those with a moist air.'—Sir J. Pringle's diseases of the army, 2d edit. p. 79.

weather, which appear to accelerate the attack of the diſeaſe, and perhaps to add ſomewhat to its ſeverity, by an afflux of fluids to the inteſtines, from a ſudden diminution of perſpiration. In ſome few inſtances, the cholera returns periodically, ſimilar to the fits of an intermittent. This form of the diſeaſe is moſt frequent in warm climates and in camps, and ſeems to derive its origin from the cauſe of the marſh fever acting in conjunction with that of the cholera. It is more dangerous in its conſequences than the ſimple cholera, and is cured as an intermittent.

203. When a morbid ſecretion in the liver, the accumulation of bile in the bowels, and its acrimony from ſtagnation, are conſiderable, this diſeaſe, in irritable habits, is attended with great danger, and ſometimes ends fatally, eſpecially when ſtrong vomits and draſtic purges have been exhibited, with an intention to evacuate the bile, the acrimony of which, in ſuch

caſes,

caſes, is too conſiderable to admit of an addition from ſtimulating remedies. Warm water, weak chicken broth, thin water gruel, or ſuch mild demulcent drinks, given in large quantities, are the only means we can employ in attempting to dilute and evacuate the ſuperabundant bile, particularly during the firſt day or two of the diſeaſe, which is often ſo violent in its effects as to exhauſt the whole powers of life; on which account wine, as a cordial, is neceſſary; and we are ſometimes neceſſitated to moderate the ſeverity of the ſymptoms by opiates, which otherwiſe ought not to be given, till the ſtomach and bowels are cleared of their acrid contents. But, fortunately, thoſe dangerous caſes are not frequent in this country, where a ſimple cholera ſeldom continues with any degree of violence above two or three days, and is not accompanied with any degree of fever. For that frequency of pulſe, which ſo often attends ſickneſs, pain, and conſequently a general diſorder of the ſyſtem, does not

ariſe from a proper febrile ſtimulus, and, in this diſeaſe, ceaſes on the evacuation of the bile from the ſtomach and bowels. In ſlight caſes of this diſorder, it often goes off gradually in a gentle diarrhoea; but, where it is more ſevere, from a larger quantity of acrid bile, its expulſion is greatly promoted by mild emetics, laxatives, and plentiful dilution.

204. Whilſt the bile remains in the bowels in any conſiderable quantity, it muſt, by its ſtimulus, increaſe the ſecretion by the glands of the inteſtines, and probably that of the liver itſelf. For the evacuation by vomiting, and by purging, in the courſe of 24 hours, is often amazingly great; but gradually leſſens with the degree of ſtimulus applied to theſe parts. After the bile has been moſtly carried off in the courſe of the diſeaſe, it often leaves ſuch an irritability on the nerves of the ſtomach and bowels, as prevents theſe viſcera from bearing even the natural ſtimuli of the gaſtric and

inteſtinal

inteſtinal fluids; ſo that a diarrhoea with gripes, and an obſtinate vomiting of every thing taken into the ſtomach, continue for ſome days. Our beſt remedies for theſe complaints are opiates given in ſmall doſes, and repeated at proper intervals. For the ſtomach, on ſuch occaſions, commonly rejects a full doſe of laudanum when given at once. On which account I uſually prefer the ſolid opium, giving no more than one-fourth of a grain, and repeating it every hour or two, until the preternatural irritability of the ſtomach and inteſtines is corrected. With ſome patients the ſaline mixture, given in a ſtate of effervescence, is not only grateful to the ſtomach, but in ſome inſtances has ſtopped the vomiting when opium had failed. In ſuch caſes, it is only the lighteſt and the moſt grateful food, in ſmall quantities, with wine, that will remain on the ſtomach.

205. In every caſe of cholera, it is to be preſumed, from the nature of the diſorder, that

that a morbid ſecretion of bile has ſubſiſted for ſome time previous to the attack of the diſeaſe. In moſt patients of this country, the diſeaſe is of a ſlight nature, and the ſecretion of the bile ſoon returns to its natural ſtate. But, where an increaſed ſecretion in the liver ſtill continues, ſubjecting the patient to a return of the diſorder; or, when a diarrhoea is kept up after an emetic and laxative, to clear the ſtomach and bowels, we are obliged to have recourſe to bitters; amongſt which the columbo root is thought to be the moſt ſucceſsful, to the quantity of ten, fifteen, or twenty grains twice a day, in a table ſpoonful or two of ſimple cinnamon or mint-water. But my greateſt dependence is on the bark, riding, and a proper regulation of diet.

206. In military encampments, towards the end of a very warm ſummer, eſpecially in the ſouthern latitudes, this diſeaſe frequently becomes more formidable in its conſequences. It is uſually more ſevere in its

its attack, continues longer, and the patient is more liable to relapſe. Theſe effects are owing to a more diſeaſed ſtate of the glands, and of the ſecretion in the liver, than commonly happens in Britain; the reſult of which is often ſchirrous obſtructions in that viſcus, and in ſome patients the liver inflames and ſuppurates. But as this laſt complaint is oftener the conſequence of the bilious remittent and intermitting fever, than of the cholera, with which they are intimately connected, the conſideration of it ſhall be referred till we treat of theſe diſeaſes.

SECTION

SECTION VIII.

OF THE BILIOUS, REMITTING, AND INTERMITTING FEVER.

207. THE bilious, remitting, and intermitting fever of autumn in this country, and in every ſeaſon of the year in warm climates, is more various with reſpect to the danger attending it, and likewiſe to the form in which it makes its firſt attack, or aſſumes, during its continuance, than any other febrile diſeaſe to which mankind are ſubject. Its moſt common appearance, at its commencement, is that of a continued fever. It begins with a chilline ſs, laſſitude, dulneſs in the eyes, a quick and depreſſed pulſe, a nauſea, uſually a vomiting, headach,

headach, and ſometimes a purging of bile, with an alleviation of ſymptoms; eſpecially, if theſe evacuations are aſſiſted with plentiful draughts of warm water, or gentle emetics and laxatives. The patient often complains of pains in the back and limbs; and, as the chilline ſs goes off, the pulſe becomes gradually ſtronger and fuller; the heat and thirſt are conſiderable; the tongue and fauces in a few days become foul, and covered with a thick ſlimy ſubſtance, which varies from a whitiſh to a brown or blackiſh colour, according to the ſeverity of the diſeaſe. A certain inquietude and reſtleſsneſs, with a want of ſleep, commonly accompany the courſe of the fever. In three or four days, and ſometimes earlier, it has ſenſible remiſſions. The exacerbations of the fever are uſually in the evening. Its violence ſomewhat abates by an imperfect ſweat in the morning. When the diſeaſe is of a mild nature, it, for the moſt part, goes on in this way for eight or ten days, and terminates in ſome critical evacuation

by

by the ſkin, kidneys, or inteſtines. But the ſame diſeaſe, in ſome parts of Hungary, in Zealand, or even in the fenny parts of Lincoln and Cambridge ſhires, but eſpecially in the ſwampy grounds on the banks of rivers and lakes within the tropics, is a much more formidable diſtemper, as it often proves fatal in 48 hours from its firſt attack. It then commonly aſſumes the form of an ardent fever, with a high delirium, which, in ſome caſes, goes off with a moiſture on the ſkin, and remiſſion of the fever in the morning; but returns about the ſame time next evening. Such fevers, under proper management, come in general to have complete intermiſſions; but, when they go on in the ſhape of remitting fevers, they uſually laſt ſeveral weeks, with ſymptoms of great malignancy and danger.

208. The fever which I have endeavoured to deſcribe commences, in this country, with the month of Auguſt, and continues

continues till the cold weather in October, when it gradually declines. In dry and well ventilated ſituations, it is far from being a frequent diſeaſe, and is not attended with that degree of danger which uſually accompanies the ſame diſorder in the neighbourhood of ſwampy and fenny grounds, where it is almoſt, every autumn, an epidemic diſeaſe, eſpecially after warm and rainy ſummers. In the former of theſe ſituations, this diſorder commonly goes on in the form of a remitting fever till it terminates in the recovery of the patient, in ſome other diſeaſe, or in death. It ſeldom takes the form of an intermittent, though it does ſometimes, eſpecially in thoſe who have been formerly afflicted with that diſtemper; and when this happens, after proper evacuations are made, the diſorder is more eaſily cured, than in the low and marſhy places. In ſuch ſituations, the diſeaſe is of a more malignant nature, is more intractable, and aſſumes a greater variety in its appearance. For the magnitude of the

diſeaſe is always in proportion to the heat and moiſture of the ſeaſon or climate, and the quantity of dead animal and vegetable ſubſtances corrupting in the adjacent grounds. This diſtemper is moſt fatal to armies, and to Europeans, after their arrival in countries between the Tropics. For, in encampments, ſoldiers are more expoſed to the heat of the ſun, during the day, to cold in the night, to unwholeſome vapours in the atmoſphere, ariſing from wet grounds, or from privies, than the inhabitants of towns and villages. In warm climates, as the heat is greater and more conſtant than with us, the growth and decay of inſects, reptiles, and vegetables, muſt be quicker, and, of courſe, the miaſma more exalted and powerful in its effects than in colder climates. Theſe fevers, among ſoldiers in the field, are of a more inflammatory nature than amongſt the peaſants, or people of better condition, becauſe military men are much expoſed to cold. And when, from neceſſity, hoſpitals become crowded,

human

human effluvia, the ſource of the hoſpital fever, adds greatly to the malignancy and danger of the diſtemper.

209. The different forms under which this diſeaſe appears in encampments, are thoſe of remitting fevers, which are moſtly of the malignant kind, quotidians, tertians, quartans, diarrhoeas, and dyſenteries. This laſt is a moſt frequent diſeaſe in encampments and military hoſpitals, partly from the cold, whilſt the ſoldiers are on duty in the night, acting as an occaſional cauſe in giving the diſorder this particular turn to the inteſtines, but chiefly from the infection of the privies. This is one of the many proofs we have of the power of every ſpecies of febrile contagion in the production of the ſame diſeaſe from whence it had its origin, and are, on that account, called ſpecific.

210. The different names given to this diſeaſe, from the various forms under which

it

it makes its appearance, are apt to ſuggeſt the idea of their being eſſentially different from each other. In fact, this deception is carried on by noſologiſts, who arrange them agreeably to this ſuppoſition. But, when this diſtemper comes to be endemic, and aſſumes, in different perſons, the ſeveral forms above mentioned, we frequently perceive that thoſe who are ſeized with the dyſentery, eſcape the fever, or, if ſeized with both, it is alternately, ſo that when the flux appears, the fever ceaſes; and when the firſt is ſtopped, the other returns*. Farther, that tertian agues become quotidians, theſe laſt take the form of remittents, and, in the end, change into continued fevers of the moſt dangerous kind. It is common for continued fevers to remit, intermit, and, at laſt, to end in a dyſentery. Theſe changes, from one form of this diſeaſe to another, are ſo well known to every

* Vide Sir John Pringle's diſeaſes of the army, ſecond edit. p. 51.

ry phyſician, that it is unneceſſary to cite authorities in confirmation of them. For, if we conſult theſe authors who have written on the diſeaſes of warm climates, we ſhall find examples of ſuch changes almoſt in every page. If I ſhall cite an authority or two from Sir John Pringle's medical annotations, it is becauſe few can have acceſs to them, on account of the conditions on which they were bequeathed to our college, which were, that they ſhould not be publiſhed, or read out of the library. Dr Saunders (formerly Huck), whoſe correſpondence with Sir John Pringle forms a conſiderable and valuable part of the above annotations, and who, in his obſervations on the nature and cure of diſeaſes, diſcovers an uncommon ſagacity, informs Sir John, in one of his letters from the Weſt Indies, 'that he had obſerved a relation between 'the bilious, yellow, and intermitting fe-'vers, apt to double, and the bloody flux, 'for they were diſtempers which prevailed 'at the ſame time, and very often changed

'one

'one into the other, at leaſt, in the Weſt 'Indies*.' And Dr Turnbull, late phyſician to the factory at Smyrna, informed Sir John Pringle, 'that the epidemic fever 'at Smyrna, of a bilious, putrid, or malig-'nant nature, begins towards the end of 'Auguſt. They have the ſame at Con-'ſtantinople, but milder, and approaching 'more to the nature of a regular intermit-'tent. At Smyrna, this fever remits at 'firſt, but, if left to nature itſelf, ends in a 'continued fever. The paroxyſms begin 'in the evening, and early in the morning 'there is a remiſſion with a little ſweat. 'The firſt paroxyſm begins with a pain in 'the back and rigour, but afterwards none 'of the acceſſions begin with any cold fit;' and farther obſerved, that the deſcription Sir John had given of the autumnal bilious, remitting, and intermitting fevers of the camp, and that of marſhy countries, anſwered nearly to theirs of Smyrna. He added,

* Vol. vi. p. 531.

added, 'that the diſtemper diſappeared ge-
'nerally about the end of September, but
'ſometimes ran into October, and by that
'means continued about two months. In
'ſome caſes the fever began in a tertian
'form, but more generally in a quotidian;
'and, if no proper means were uſed, they
'all ended in a continued fever. The du-
'ration of each incidental caſe is uncer-
'tain, there being no critical days. Some
'grow yellow about the fifth or ſixth day,
'and that is accounted a very bad ſign, as
'are worms, and the coming on of the fe-
'ver with a vomiting of a greeniſh or yel-
'lowiſh bile. If the uſual vomit of eme-
'tic tartar, in the advanced ſtage of the diſ-
'eaſe, has no effect, it is a mortal ſign. In
'this fever the hypochondria are common-
'ly inflated, and an uneaſineſs is felt by
'the patient when they are preſſed. The
'cure of this fever was chiefly effected by
'ſuch medicines as cleared the primae viae,
'as tartar emetic, laxatives, and glyſters.
'When the fever remits, the cure is car-
'ried

'ried on by the bark in the following 'manner: ℞ Mellis ʒi, Camphorae ʒi, ſimul 'probe terantur ad ſolutionem camphorae, 'dein adde cort. Peruv. pulv. ʒi m. f. maſ-'ſa, et e ſingulis drachmis formentur pilu-'lae No. xv. capiat aeger omni bihorio, 'remittente febre, pil. x. If the patient 'had time to take fifty ſuch pills before the 'acceſſion of the next paroxyſm, it was 'always an eaſier one than any of the pre-'ceding; but if he could, in that ſpace, 'take one hundred pills, the fit never re-'turned. When there was a more than 'ordinary diſpoſition to putrefaction, and 'the pulſe was low, he doubled the quan-'tity of camphire, and with a good effect. 'He ſeldom had occaſion to uſe more than 'one ounce of the bark, or an ounce and a 'half: He cured common intermittents in 'the ſame way. The eating of meat or 'fiſh was apt to bring on a relapſe with 'the convaleſcents *.' But, as theſe Medical Annotations

* Med. Annot. vol. vii. p. 526.

Annotations appear to have been begun and carried on, with a view to render the hiſtory of diſeaſes more complete, from a great number of caſes, with general obſervations on moſt of them, though without ſeeming to have any particular theory to ſupport, my intention, in reading through the whole of this voluminous work, was to obſerve what this learned Gentleman and his correſpondents would ſay on ſuch a plan, which might lead us to a more intimate acquaintance with the origin and nature of the diſeaſes under conſideration. In this purſuit, I have every where obſerved, on the ſubject of the bilious fever, from whatever part of the world he received his information, that intimate connection between the ſeveral forms under which it makes its appearance, ſo often mentioned in the preceding pages. This evidently ſhows that they had the ſame original cauſe, notwithſtanding their apparent difference. This circumſtance deſerves our ſerious conſideration; for, if we ſhall be ſo fortunate

as to discover the source of this strict relation between these several diseases, we may arrive at a more distinct view of their nature and causes.

211. Almost the whole of the general causes of fevers, (p. 105.) are, at different times, more or less concerned in the production of the bilious fever of autumn. It has been shown in section 7th, that an excess of heat long continued, is specific in increasing the secretion of the bile. This effect of heat is various in different persons; for in some it is considerable, whilst in others, the secretion in the liver is little above its ordinary standard. But, whenever this secretion is remarkably increased, if previous to the coming on of the cholera, or other disorders of the stomach and bowels, the person is so exposed to cold, as to bring on some degree of fever, then the acrid bile in the primae viae helps, in proportion to its quantity and acrimony, to promote the accession of the fever. This

is,

is, perhaps, the leaſt complicated ſpecies of the bilious fever. It is not often that we meet with it in this ſimple ſtate, with reſpect to its cauſes. Theſe are more frequently combined with human effluvia, or marſh miaſma; the former always diſpoſing it to a continued form, whilſt the latter prevailing in the habit, inclines it more to remiſſions and intermiſſions. Hence it is evident, that this diſeaſe muſt, in different times and ſituations, exhibit a conſiderable variety in its nature, according to the combination of the cauſes which produce it, ſome examples of which I ſhall endeavour to point out.

212. That ſpecies of this diſeaſe, which ariſes from a catarrhal fever ſupervening on a morbid ſecretion of the bile, and an accumulation of it in the primae viae, is, in its nature, more inflammatory than the other kinds. It is moſt frequent amongſt ſoldiers doing duty in camps, or men whoſe buſineſs or pleaſure leads them to the field, where,

where, being expoſed to cold, rain, and wet clothes, they catch cold, which often proves the occaſional cauſe of this diſorder; and, from the inflammatory ſymptoms which are thereby induced, helps to diſtinguiſh it from the other kinds, where marſh miaſma, or human effluvia, are more predominant, as cauſes from which the fever derives its origin. Although theſe are probably more or leſs connected with the cauſes of every ſpecies of the bilious fever, as will appear by conſulting parag. 111. and 112.; yet in many caſes they act not with ſuch power on the body, as to characteriſe the diſeaſe, as in this we are now deſcribing, where the principal cauſes, acting on our ſyſtem, are a morbid collection of bile in the alimentary canal, and the ordinary cauſe of a catarrhal fever. But it muſt here be obſerved, that thoſe changes which are brought on the arterial ſyſtem, by the action of cold on the body, are not ſo conſiderable in the autumnal months, as in thoſe of winter and ſpring. For, after the ſolids have acquired

an

an additional ſtrength from the tonic powers of the cold, and the aſſiſtance it gives in regulating the ſtandard heat, at ſuch times, catarrhal fevers, from an exceſs in the application of cold, will ſhow more of an inflammatory diſpoſition, than the ſame diſorders in autumn, after the body has been relaxed and debilitated by the preceding heat of the ſummer.

213. From the above view of the cauſes of this ſpecies of bilious fever, it is eaſy to perceive that their action on the primae viae muſt be more powerful than that of a ſimple catarrhal fever, where the morbid affection and ſecretion of the mucous glands appear to be the principal ſource of it. Whereas, in the preſent diſorder, an increaſed ſecretion of bile is ſuperadded, and, for the moſt part, a ſtagnation of it in the bowels, by which its qualities are ſoon altered; and I am apt to believe, as mentioned in the preceding paragraph, that human effluvia, or marſh miaſma, have ſome ſhare in the

the morbid affection of the alimentary canal. Of courſe, the acceſſion of this fever is more ſtrongly marked with coldneſs, ſhivering, oppreſſion at the ſtomach, headach, and pains in the loins, than in the catarrhal fever. All which complaints are ſomewhat relieved by a natural vomiting, or the exhibition of ſuch a medicine as ſhall prove gently emetic and cathartic. But it does not entirely remove them; for, as the morbid affection in the liver and in the primae viae ſtill ſubſiſts, theſe complaints will continue with greater or leſs violence, according to the ſtate of the alimentary canal during the courſe of the fever, the duration of which is various, in proportion to the force with which the cauſes act on the ſyſtem.

214. What may be called the inflammatory ſtate of the fever, continues not commonly above three or four days; after which the remiſſions become more perceptible than in the catarrhal fever. Becauſe the

the diſeaſed ſtate of the mucous glands, and of the ſecretion performed by them and the liver, exiſt in a much higher degree, and the quantity of the fluids ſecreted by them, is alſo greater than in that diſorder; to a ſmall accumulation of which in the primae viae, I imagine, thoſe exacerbations and remiſſions are owing. For, in the very irritable ſtate of the ſtomach and bowels, an inconſiderable collection of acrid fluids will prove a febrile ſtimulus to the ſyſtem; and, of courſe, heat, thirſt, and an accelerated circulation muſt take place, and continue until its quantity is diminiſhed by abſorption, (Sect. V. parag. 178. and 179.) after which a moiſture on the ſkin commonly brings on a remiſſion; and this ſometimes happens without any ſenſible evacuation, and continues till the ſecreted fluids in the ſtomach and bowels are again collected to ſuch a quantity as is ſufficient to give ſome addition to the febrile ſtimulus in theſe parts. This is ſometimes brought about by errors in diet, or ſome miſmanagement of the patient;

tient; but the uſual time of the exacerbation of the fever, is in the evening, and the remiſſion in the morning. This periodical return I have endeavoured to account for in parag. 182. Such of the other ſymptoms of this diſeaſe as are mentioned in parag. 207. and are common to the catarrhal fever, have been already treated of in Sect. V.; and the others, which are peculiar to this diſorder, we ſhall have an opportunity of explaining, in the courſe of the cure of this fever.

215. From the above view of the nature and cauſe of this ſpecies of the bilious fever, the indications of cure muſt be obvious. So far as the origin of this diſorder is connected with the common cauſe of a catarrh, or catarrhal fever, that of obviating all tendency to inflammation, has already been ſufficiently treated of in parag. 162. 163. and 164.; but, at the ſame time, it muſt here be obſerved, that, for the reaſons mentioned above, the neceſſity of veneſec-

tion

tion is not so urgent in this as in the catarrhal fever.

216. Medical practitioners are not always agreed in the propriety of bleeding in the bilious fever of autumn; but this must have arisen from their not distinguishing the different species of it. For that we have now under consideration, in general, requires bleeding at the commencement of it, and sometimes it is repeated with great propriety; especially in cases of topical inflammation, where blisters are also of singular benefit. But in those fevers arising chiefly from human contagion, or marsh miasma, where such a remarkable prostration of strength takes place from the accession of these diseases, venesection is, in general, not only improper, but hurtful; because it increases the general debility and danger of the disease. Even the late sagacious Sir John Pringle adopted it as a general rule, to bleed at least once at the commencement of the autumnal bilious fever of the camp;

and expreſſes his ſurpriſe at the contrary practice of Dr Monchy, phyſician to the Dutch forces, who, in a letter to Sir John on that ſubject, aſſured him that he ſeldom had occaſion to bleed any of his patients in theſe fevers; the cure of which he, in general, conducted by emetics, and by keeping up a gentle diarrhoea by cryſtals of tartar, decoctions of tamarinds, and other medicines of a ſimilar nature. And, in his commentary on this letter, ſays, 'It would ſeem, 'by the above account of the cure of the 'bilious fevers, that the conſtitution of the 'Dutch ſoldiers was ſomewhat different 'from that of our men, ſince Dr Monchy 'could cure his patients ſo eaſily without 'bleeding, an evacuation, we believed, ſo 'eſſential in the treatment of thoſe fevers 'that prevailed ſo much in our army a-'broad. The ſame kind of fever, though 'in a milder degree, occurred likewiſe in 'our camps in England; and in theſe I 'ſtill found it neceſſary to begin with bleed-'ing, and generally to a pretty large quan-'tity;

'tity; and was ſometimes obliged to re-
'peat the evacuation in ſuch caſes as had
'joined to them any conſiderable inflam-
'mation*.' And this I ſuppoſe to have been done with great judgment; for the fevers which attacked the Britiſh ſoldiers encamped in England, on a dry and healthy ſituation, were likely to be more inflammatory than thoſe which they or the Dutch ſoldiers were ſeized with, when encamped on the unwholeſome ſituations in Flanders, which the nature of the war obliged them to occupy.

217. It is only from an accurate diſtinction of the ſeveral ſpecies of the bilious fever, that we can account for the difference in the practice of theſe ingenious men, with reſpect to the neceſſity of veneſection at the commencement of theſe fevers. It is more than probable, that, from the ſucceſs Sir John met with by bleeding, and even repeating

* Med. Annot. vol. 6. p. 33.

peating it in many inflammatory cafes, he might conceive a prejudice in favour of this practice, and perhaps carried it too far, by ordering this evacuation to be made ſoon after the attack of the malignant fever of the marſhes, where the patient often becomes ſuddenly delirious; but this is preſcribing to a ſymptom, and not to the cauſe of the diſeaſe; for, upon the evacuation of the acrid contents of the ſtomach and bowels, on which it depends, by emetics and laxatives, the delirium ceaſes. But as theſe fevers, from marſh miaſma, are more inclined to remiſſions and intermiſſions than other fevers, the headach and delirium are, after a certain period, apt to return; but the removal of theſe troubleſome ſymptoms ought to be attempted by a repetition of the ſame evacuations, and by bliſters, rather than by bleeding, which never fails, on ſuch occaſions, to induce a general debility. What is apt to deceive a phyſician, is the ſtrong, full, and frequent pulſe, ſoon after the acceſſion of the fever. But this muſt be underſtood

derſtood to proceed chiefly from the febrile ſtimulus on the primae viae ; and this fact is aſcertained by practice ; for, on clearing the primae viae of a load of viſcid phlegm and acrid bile, theſe complaints are greatly alleviated, and ſometimes entirely removed. On the other hand, Dr Monchy, obſerving the bad conſequences of too free a uſe of the lancet, amongſt the Dutch ſoldiers afflicted with the bilious autumnal fever of the camp, it might render him extremely cautious with regard to bleeding them in thoſe diſeaſes ; and, when a perſon is under a prejudice in this reſpect, it makes him timid, even where it may be done with advantage.

218. Sir John, on account of the difference between Dr Monchy's and his own practice, alledges, that the conſtitutions of the Dutch ſoldiers may be ſomewhat different from thoſe of the Britiſh troops, and in ſome meaſure it may be ſo ; for it is not unreaſonable to ſuppoſe, that the Dutch ſoldiers,

diers, living in ſo low, moiſt, and marſhy a country as Holland, may, notwithſtanding the power of habit, bring to the field the prediſpoſing cauſes of the malignant fever, in a higher degree than Britiſh ſoldiers, who, previous to their embarkation for Germany, lived in a dryer and more healthy climate.

219. I ſhould not have inſiſted ſo long on this article of veneſection, if I had not been convinced of the importance of the ſubject, which can only be ſettled with advantage to the ſick, by the phyſician of judgment, who knows how to diſcern between the inflammatory ſpecies of the bilious autumnal fever, where the effects of an application of an exceſs of cold to the body, appears to have a conſiderable ſhare in the production of it, and the malignant kind, which chiefly ariſes from the putrid vapours of marſhes and fenny grounds. For, in the former of theſe, bleeding is, in ſome few caſes, indiſpenſibly neceſſary; but

the

the quantity to be taken away, and the repetition of this operation, muſt entirely depend on the conſtitution of the patient, and the inflammatory ſtate of the fever; whereas in the latter, veneſection is ſeldom neceſſary; and where, on account of ſome urgent ſymptom, it is thought adviſeable, it ought to be done with caution; for a large evacuation of blood, in ſuch caſes, is commonly attended with danger, and, from the reduction of the ſtrength of the patient, the leaſt of its bad conſequences is a tedious protraction of the diſeaſe. And it is only in this way of conſidering the ſubject that we can poſſibly ſettle this point, which is ſo warmly litigated by various authors.

220. The next indication is to clear the ſtomach and bowels of their acrid contents, which, in this particular ſpecies of the bilious fever, is beſt done by a common emetic, and afterwards a gentle laxative medicine, ſuited to the ſtrength and conſtitution of the patient, which in general alleviates the

the ſymptoms, and renders the courſe of the fever milder and more tractable, than when theſe evacuations are omitted; but it ſeldom entirely removes the fever, unleſs when the patient gets naturally into a general perſpiration or ſweat. This perſpiration may be encouraged, but ought by no means to be forced; for, as partial ſweats are never critical, and debilitate the patient, they ought to be avoided as much as poſſible, by light clothes, cool air, and cool drink. Sometimes, a ſpontaneous vomiting and purging of bile ſuperſede the neceſſity of the above medicines, little more being wanted than ſome draughts of warm water, to aſſiſt nature in the expulſion of it. But where I ſuſpect that a complete evacuation of the bile has not taken place, I commonly, to obtain this end, give, from time to time, ſmall doſes of tartar emetic, ſo as to produce a full vomiting, and this uſually brings on alſo a diarrhoea; but, where it fails to have this effect, ſome laxative medicine ought to be adminiſtered.

221.

221. I have formerly ſhown, (parag. 149. and 174.) that the cauſes of diſeaſes may act for ſome time without the body being ſenſibly affected, as is the caſe before the acceſſion of moſt fevers. And we may here alſo obſerve, that when, from the force of their action, or the length of time in which it has been continued, ſuch conſiderable changes take place in the ſyſtem as to conſtitute a diſeaſe, though we may, on ſuch occaſions, remove ſome of the effects of theſe changes, or ſuch ſtimuli as evidently heighten the diſorder; yet theſe morbid changes ſtill exiſting in the body, ſome time is required, even in ſuch caſes as are curable, before the effects of the cauſes which have acted on the body can be removed, and the ſeveral functions which have been thereby diſturbed can be brought back to their natural and healthy condition. If, therefore, after the neceſſary evacuations are made at the commencement of a fever, we perceive that the diſeaſe ſtill goes on, then the greateſt ad-

vantage the patient can perhaps receive from the attendance of the phyſician, muſt be from his endeavours to reſtrain the efforts of nature when too violent, to ſupport her when languid, to remove ſtimuli of every kind which aggravate the fever, to remedy the effects of the cauſes acting on the ſyſtem, and, as far as it may be in our power, to preſcribe to the cauſes themſelves, until a ſalutary criſis ſhall put a period to the diſtemper.

222. If we take a view of the practice of ſuch phyſicians as have been eminent in their profeſſion, we ſhall perceive the whole of their method of cure, in fevers, to be conducted upon ſuch a plan as the above: For, whilſt the inflammatory ſtate of the fever continues, if it runs ſo high as to prognoſticate danger to the ſick, then every means is uſed to repreſs its violence. But, as this cannot be done without inducing a proportionable debility, it muſt be proſecuted with diſcretion, and not carried

too

too far; becauſe, if the fever ſhall be protracted to any conſiderable length, and no one can ſay preciſely how long it may continue, then, from the great irritability of the ſyſtem, the rapid manner in which the circulation is carried on, the irregular performance of the ſeveral functions, a conſiderable waſte of the fluids, and low diet, the ſtrength of the patient muſt daily diminiſh, which obliges them often, in the courſe of the fever, to adopt a contrary plan of increaſing the ſtrength of the patient by ſtimulants, cordials, and wine, ſometimes to a conſiderable quantity: But, as theſe circumſtances of their plan of recovery are applicable to all fevers, and what will be naturally attended to by every practitioner of judgment, it is unneceſſary in this place to enlarge farther upon them. Indeed, moſt of the morbid conditions which exiſt under any proper febrile diſorder of the body, being common to every ſpecies of fever, the indications of cure, in all, muſt be nearly ſimilar. They differ only in certain

tain particulars, reſpecting the origin of the fever, and in ſome ſymptoms neceſſarily ariſing from it, which help to characteriſe the ſpecies, and no doubt often conſtitute an eſſential difference amongſt them. Hence, in ſo far as the above ſpecies of the bilious fever may have a ſimilarity, at its commencement, with the common catarrhal fever, the indications of cure and general management of the ſick, during the courſe of the diſeaſe, having been already fully ſtated in paragraphs 184, 185, &c. it is unneceſſary in this place to repeat them: On which account we ſhall proceed to conſider ſome other circumſtances, which, although not peculiar to this diſtemper, are more conſpicuous in it than in the continued catarrhal fever.

223. One of theſe circumſtances is a larger ſecretion of bile, and, I imagine, of phlegm, from the mucous glands in the primae viae, than uſual, which in ſome caſes brings on a diarrhoea, but for the moſt

part

part accumulates and ſtagnates in the inteſtines, where, from its ſtimulus, the fever is heightened, and is often the cauſe of headachs, ſtupor, delirium, and other affections. This ſhows the neceſſity of keeping the body moderately open through the courſe of the fever, which ought to be done by ſuch medicines as create the leaſt diſturbance in their operation on the bowels. An inexperienced perſon might imagine, that an emetic and laxative would be the moſt likely means, on ſuch occaſions, to clear the primae viae; but practice every day ſhows, that this is not always the moſt adviſeable method; for, although this can be done with advantage at the beginning of the fever, and even repeated occaſionally on the third or fourth day, yet, when the fever is farther advanced, all medicines of a rough operation ought to be avoided, becauſe of the greater debility and irritability of the body at that time, which are apt to be increaſed, and ſometimes to a conſiderable degree, by medicines of a violent

lent operation. I ſeldom in thoſe fevers give a vomit after the fourth or fifth day, unleſs where ſuch an evacuation has been omitted at the commencement of it; and, even then, I commonly preſcribe in ſuch a way as not to excite a full vomiting, but only to cauſe the perſon to throw up as if his ſtomach was diſordered, giving him no more than a draught or two of warm water to aſſiſt its operation, directing the emetic to be taken afterwards in ſmaller doſes and at longer intervals, until it ſhall procure the patient two or three looſe ſtools. This is done in a variety of ways, often by a ſolution of tartar emetic in common or ſome ſimple diſtilled water, in the proportion of half a grain to an ounce, giving this quantity every hour till it operates. I more frequently preſcribe a grain of emetic tartar, rubbed with ten or twelve grains of ſugar, to be given every two hours till it has had the deſired effect. Sometimes, to obtain the ſame end, two or more grains of tartar emetic, with an ounce of Rochelle

ſalts,

ſalts, are diſſolved in a pint of water; two, three, or four ounces of which ſolution are given every two hours, or in ſuch proportion that every doſe ſhall contain at leaſt half a grain of the emetic tartar: But, if this medicine is made with the butter of antimony, half that quantity is ſufficient, it being double the ſtrength of that made in the common way.

224. After the primae viae have been thus cleared, we muſt return to the general management of the patient, as mentioned in paragraph 222. till a favourable criſis puts a period to the diſeaſe. It is uſual, at ſuch times, to preſcribe ſaline draughts, made with the fixed or volatile alkalies, which is a good enough vehicle for other medicines of a more certain operation, but, of themſelves, are of little uſe. I believe, if they could be given in larger doſes than is commonly ordered, they would, in many caſes, prove diuretic, diaphoretic, and ſometimes laxative. But the ſtomach

can

can ſeldom bear ſuch a quantity as to have theſe effects. At the ſame time, in private practice, phyſicians cannot repeat their viſits often without preſcribing, otherwiſe they run the hazard of being thought neglectful of their patient, or at a loſs how to preſcribe; and on ſuch occaſions it is as good a medicine as any other, when little or nothing is to be done.

225. As the effects of heat, in the production of large ſecretions of bile, have been fully ſtated in Sect. VII. then, in every febrile diſorder, eſpecially thoſe which continue for any conſiderable time, where the heat of the body, from an accelerated circulation, is conſtantly kept up ſome degrees above the ſtandard point, it is not unreaſonable to ſuppoſe, that the ſame effects take place. In fact, we find, that in all fevers, but particularly in thoſe of the bilious kind, where an increaſed ſecretion in the liver has ſubſiſted for ſome time, collections of bile in the primae viae often obſtruct

the

the ordinary courſe of the fever, raiſe conſiderable diſturbances in the body, and particularly in the head, which ſympathiſes in ſo remarkable a manner with theſe viſcera. Notwithſtanding our knowledge of this fact, we cannot, for the reaſons mentioned in parag. 223. adminiſter the ſame remedies, in the advanced ſtate of the fever, for the removal of the acrid contents of the inteſtines, we could have done at the commencement of it, when the ſtrength of the patient was leſs impaired. For, after the fifth or ſixth day of the diſorder, if we have reaſon to ſuſpect an aggravation of the ſymptoms, from a retention of the faeces, and other acrid colluvies, and, on that account, are obliged to clear the bowels of them, we muſt have recourſe to gentler means. Laxative glyſters, in general, anſwer this purpoſe, provided they are daily exhibited. But it often happens, after the fever has continued for ſome time, and a ſtupor commences with a ſlight delirium, that the bowels appear to loſe ſomewhat of

their irritability, and likewiſe of that force in their periſtaltic motion they had in the earlier part of the diſeaſe. In ſuch ſituations, the bile, and other inteſtinal fluids, accumulate, and ſtagnate about the ſack or beginning of the colon, generally beyond the reach of glyſters, which, at ſuch times, have very little effect in clearing the bowels of their contents, and this obliges us to have recourſe to other means. From half a drachm to a drachm of polychreſt ſalts in a draught, ſometimes with the addition of a few grains of rhubarb, given once or twice a day, for the moſt part anſwer the purpoſe of emptying the bowels, and may be repeated occaſionally, during the courſe of the fever, with great advantage. If any conſiderable degree of coſtiveneſs has ſubſiſted for ſome days, I often prefer a decoction of tamarinds with ſenna, giving two or three ounces every two hours till it operates; after which I uſually return to the above draughts, when there is occaſion for them.

226.

226. This circumſtance of freeing the primae viae from faeces, bile, and viſcid phlegm, ſo apt to accumulate in them, and thereby to protract and increaſe the danger of the diſeaſe, ought to be, from time to time, carefully attended to, but, in ſuch a manner, as to guard againſt any diminution of the ſtrength of the patient. For, if ſuch an accident ſhould unfortunately happen, at an advanced period of the diſeaſe, much miſchief is to be apprehended from it, as it is ſeldom in our power, by wine, or other cordials, to re-eſtabliſh the ſtrength of the ſyſtem. At the ſame time, it muſt be obſerved, that, in moſt caſes, where the bowels are loaded with acrid contents, and where the ſick can bear the evacuation propoſed, it is commonly ſucceeded by a greater degree of firmneſs and regularity in the pulſe. It frequently carries off a ſlight delirium or ſtupor, and diſpoſes the perſon more to a critical evacuation by ſweat than could be expected, whilſt the functions of

the

the body were ſo much diſturbed by the putrid fomes of the alimentary canal.

227. It is from theſe remarkable changes in favour of the patient, and ſometimes from a criſis happening ſoon after the bowels had been thus relieved, that the active preparations of antimony have been brought into ſuch general uſe, and that James's powder has acquired ſo much reputation in the cure of all febrile diſorders. Not that I believe it poſſeſſes greater virtues than tartar emetic, or the calx antimonii nitrata, when properly prepared, and given with judgment, as will appear from my obſervations on this ſubject in parag. 187. and 188. Nay, Dr James himſelf ſeems to have been of this opinion; for, in repeated converſations with the late Sir John Pringle, on the uſe of his powders in fevers, he frankly owned, that their principal efficacy conſiſted in clearing the primae viae of viſcid phlegm, putrid bile, and faeces. This, from long experience, he had

had found was an eſſential circumſtance to be attended to, in every ſpecies of fever; and, after this evacuation was made, if no ſweat ſucceeded, it was his uſual practice to give ſmall doſes of his powder every four or ſix hours, to bring out a moiſture on the ſkin. But, if he did not ſucceed in this intention, the powders were laid aſide, and the cure conducted agreeable to the general practice of other phyſicians; and he appears to acknowledge, with more frankneſs and honeſty, than the venders of noſtrums commonly poſſeſs, that all the effects of his powders were to be obtained by a judicious exhibition of tartar emetic, when the preciſe ſtrength of it was known to the preſcriber. For his notion of fevers was, that they all had a tendency to remit or intermit; but theſe changes, from a continued form, are in certain caſes obſtructed, either from ſome inflammation or a foulneſs in the primae viae, and that his powder did not ſo much cure a fever, as diſpoſe it to remit or intermit, and thereby to make

way

way for the bark, which he properly conſidered to be the grand febrifuge. He ſometimes, however, met with inſtances of fevers kept up ſolely by putrid bile, and other acrid excrementitious matters in the inteſtines, and with ſuch perſons his powders uſually carried off the diſorder entirely, in a few hours *. This fact, Sir John muſt have been perfectly ſatisfied with, becauſe he himſelf gives ſeveral examples of remittents and intermittents which had reſiſted the bark and other medicines, but were immediately cured on the evacuation of viſcid phlegm and putrid bile, of an offenſive ſmell, from its having been lodged in the primae viae for a conſiderable time †. And, with regard to the whole of Dr James's practice in fevers, Sir John was not only ſo well convinced of his judgment in his general plan of the cure of fevers, but, from the

* Med. Annot. vol. iii. p. 163. 170. and vol. viii. p. 126. 218. 264. et ſeq.

† Ibid. vol. vi. p. 174. 323. and vol. vii. p. 63.

the free and unreſerved manner in which he anſwered every queſtion put to him on that ſubject, that he reſolved never to refuſe to meet him again in conſultation.

228. But if, after having taken the above view of the manner in which the preparations of antimony produce their ſalutary effects in fevers, we ſhall proceed to conſider how far many of them are calculated to operate in an uniform way in moſt caſes. We may, without being tedious, on a ſubject ſo well treated in moſt of the modern ſyſtems of chymiſtry, be allowed to obſerve, that all thoſe preparations which are the reſult of a calcination of the antimony, either alone, or with the aſſiſtance of various portions of nitre, will not always turn out to be of the ſame degree of ſtrength, when the identical proceſs is repeated, from the great difficulty there is in giving the antimony always the ſame preciſe degree of calcination. This is the reaſon why the ſame medicine, but made at different

different times, varies in its ſtrength; becauſe the exact quantity of the ſoluble calx, in the ſeveral ſpecimens, are different; and, of courſe, when diſſolved by any acid in the ſtomach, their operation will be in proportion to the quantity of ſoluble calx they contain. For, from the precipitate of the butter of antimony, by diluting it with warm water, in which a ſufficient quantity of fixed alkaline ſalt has been diſſolved, to render the precipitation complete, we have a very active preparation; becauſe it contains a due quantity of the inflammable principle of the ſemimetal, to inſure its ſolubility in any acid. But, when the ſame powder has been repeatedly diſſolved in the nitrous acid, and afterwards calcined, as in the proceſs for making the bezoar mineral, it is thereby entirely deprived of its principle of inflammability, on which the ſolubility of all metallic ſubſtances depends, and becomes an inert calx, incapable of being acted on by any acid. The ſame may be ſaid of the other calces of antimony, when

an

an over proportion of nitre is uſed in the preparation of them. But the greateſt inconvenience ariſing from the exhibition of all theſe preparations of antimony, not previouſly combined with an acid, is the uncertainty of their operation; for, if they meet with a ſufficient quantity of acid for their ſolution in the ſtomach, their action on the primae viae will be in proportion to the quantity of the ſoluble calx they contain; but, if there ſhall be no acid in the ſtomach, then they can have no more effect than as much crabs eyes. This laſt circumſtance ought to direct us to thoſe preparations of antimony which are already joined with an acid; becauſe they are more certain in their operation, and their ſtrength is eaſily aſcertained.

229. Our calx antimonii nitrata was ſuppoſed to be ſimilar to James's powder. But, upon repeated trials, I have found, that five grains of the latter were equal to about eight or ten grains of the former,

and were always more certain in their operation. This made me imagine that Dr James had mixed a certain portion of tartar emetic with his prepared calx; and, from a report of his using mercury in the compoſition of his powder when he obtained his patent, I ſuppoſed him at that time to have uſed a ſmall portion of the powder of algaroth, or of emetic tartar made from it. But being afterwards told, that he had thrown out the mercury from the compoſition of his powder, I naturally imagined that he ſubſtituted in the place of his former preparation, a certain proportion of common tartar emetic *. And, in fact, I find, that, if one grain of that medicine, prepared according to our laſt diſpenſatory, is intimately mixed with twenty grains of the calx antimonii nitrata, by rubbing them well in a glaſs or glazed mortar, its operation

* In this ſuppoſition I was confirmed from Dr James's powders becoming much milder in their operation than they were for ſome time after he firſt obtained his patent.

tion and ſtrength appear nearly ſimilar to thoſe of the celebrated powder of Dr James, which never did contain any mercury, though corroſive ſublimate might be uſed in the proceſs for making his firſt tartar emetic.

230. Upon the whole, I am of opinion, that the active preparations of antimony are uſeful remedies in the cure of fevers in general, and particularly in thoſe of the bilious kind. For, in certain caſes, after the uſual evacuations have been made, if, about the fourth or fifth day of the diſeaſe, bile and faeces are ſuſpected to be again collected in the bowels, then a ſcruple of the calx antimonii nitrata well rubbed with one grain of tartar emetic, and divided into four equal parts, prove an excellent medicine for clearing the primae viae, and anſwering the other intentions of an antimonial, by giving one paper every three or four hours, until it has had a proper effect. After this, though the fever continues, I ſeldom repeat this medicine

medicine for ſome days, being convinced, from experience, that the keeping up a conſtant irritation on the bowels, for ſeveral days, by antimonial preparations, debilitates the ſyſtem conſiderably. On which account, for ſome days, the body ought to be kept open by laxative glyſters; and, when they fail to procure the neceſſary diſcharge, the powder may be again renewed; which, of all the antimonial powders, comes the neareſt to that of Dr James in its operation and effects, and, as I know the compoſition, I always prefer it. But I am giving a reaſon for its preference, which is not always a good one with the public, who, from an unaccountable imbecillity, have greater faith in the virtues of any medicine vended as a noſtrum, than when they come to know its exact compoſition. Phyſicians of practice, on many occaſions, are obliged to avail themſelves of this knowledge, otherwiſe the medicines they order loſe credit with their patients, whoſe faith in their virtues continues ſtrong, even in the moſt

moſt ſimple remedies, whilſt they remain ignorant of what is preſcribed for them.

231. After the inflammatory ſymptoms of this ſpecies of fever come to abate, it uſually remits; and in ſome few patients it puts on the form of an intermittent, eſpecially in camps and in the neighbourhood of marſhy grounds; at which times, in both caſes, the Peruvian bark, under a right management, is the proper remedy for carrying off the diſeaſe, or ſecuring the patient againſt a relapſe. This, in general, is to be ſuſpected, when the fever goes off without any critical diſcharge by the ſkin, inteſtines, or kidneys; and, from our not obſerving that diſtinct precipitation of a whitiſh ſmooth ſediment in the urine, which commonly attends every ſalutary criſis, ſometimes approaching to a brown or brick duſt colour, as the diſeaſe partakes more or leſs of the nature of an intermittent. When the remiſſion happens, in conſequence of an evacuation of bile and faeces, from the exhibition

hibition of ſuch an antimonial medicine as mentioned in the preceding paragraph, or by other means, I commonly begin to give the bark in ſubſtance, to the quantity of half a drachm, or two ſcruples, every four or ſix hours; and, although it does not always carry off the fever immediately, yet it has often the effect to leſſen the degree of it. But, where the remiſſions happen without ſuch an evacuation, it ought always to be endeavoured, if the ſtrength of the patient will permit, to clear the primae viae, which uſually renders the remiſſions more complete; after which the bark is given with greater advantage.

232. In preſcribing this medicine I obſerve not any particular formula, being obliged to vary the mode of giving it according to circumſtances; for it may be taken in wine, in butter-milk, or in the form of a bolus, or of pills. I ſometimes mix it with ten or twelve drachms of a decoction of the bark, and, to this are added about two

drachms

drachms of the tinctura corticis, which makes it more cordial, and, with particular perſons, it ſits lighter on the ſtomach. But I am more ſolicitous to make the patient take a certain quantity in the 24 hours, which is from two to four drachms, than about the mode of giving it. When it purges, four or five drops of laudanum, in two or three of the draughts, commonly remove that effect. But if, after two days uſe of the bark, the fever is not diminiſhed, or the intermiſſions are not rendered more diſtinct, I lay it aſide, and wait for a more favourable opportunity to renew the exhibition of this medicine with greater ſucceſs. This is done with more advantage when the inflammatory ſtate of the diſeaſe is leſſened, when the action of the cauſe of the fever on the body has become leſs powerful, or when a farther evacuation has been made of acrid fluids in the inteſtines. For, if any of theſe circumſtances exiſt to a certain degree, ſuch an irritability is excited in the ſyſtem as prevents the bark

bark from having its proper effect in leſſening the mobility of the ſyſtem, and rectifying the morbid ſecretions in the primae viae, on which the continuance of the fever and its conſequences ſeem chiefly to depend. In both the remittent and intermittent diſeaſes, the operation and effects of the bark appear to corroborate this ſuppoſition, the particular conſideration of which I ſhall poſtpone until we come to the cure of an intermittent.

233. Although certain fevers, at their commencement, may be more or leſs of an inflammatory nature, yet, from the ſeveral evacuations, and other means uſed to repreſs their violence, they, by degrees, loſe a great deal of that diſpoſition, and, from the low diet, a conſtant accelerated circulation, and increaſed heat, the powers of the ſyſtem gradually decline, the fluids become more putreſcent, and the fever puts on a different type from what it had at firſt. In this advanced ſtate of the diſeaſe, debility prevails,

prevails, the ſecretions are leſs mild, the tongue and teeth are covered with a whitiſh or browniſh coloured glutinous matter, and a quantity of viſcid ſlime frequently collects about the fauces. This ſlime often gives the ſick ſome degree of difficulty in ſwallowing, until it is cleared off by waſhing or gargling the throat; and, when a patient is under ſuch circumſtances, we may ſuſpect the fluids in the ſtomach and bowels to be of a more putrid nature than uſual. On which account, I commonly preſcribe five grains of my compound powder of the calx antimonii nitrata, (parag. 229.) to be given every four hours, to clear theſe viſcera; if the perſon can poſſibly bear that evacuation, which, on ſuch occaſions, is commonly done with an alleviation of ſymptoms, and, I have often had reaſon to believe, brought on a criſis ſooner than would otherwiſe have happened.

234. Till a criſis takes place, our moſt valuable remedies are corroborants, cordials, and antiſpaſmodics, as the bark, camphire, wine, and opium. But, in low conditions of the body, the doſes of medicines ought to be proportioned to the ſtrength of the patient, otherwiſe we rather do miſchief than good, by increaſing the debility, from their effects on the ſtomach, and, of courſe, on the reſt of the ſyſtem. Camphire, in many caſes, is an excellent cordial, and, as an antiſpaſmodic may be given, when the powers of the body are but little impaired, and in ſuch a quantity as would, in the low ſtate of fevers, prove a poiſon. The ſame may be ſaid of laudanum, and I have often known ſuch a quantity of bark and wine given in low conditions of the ſick as had evidently a contrary effect from that which was intended. On which account, I have always thought it the ſafeſt plan rather to give the patient leſs medicine than to err in giving more than he can eaſily bear. In this way, my doſes are exceedingly

ceedingly various. I give, for example, of camphire, when it agrees with the ſtomach from four to twelve or fifteen grains in the twenty-four hours, when I perceive it anſwers as a cordial and antiſpaſmodic. Laudanum ought to be managed in the ſame manner, when it is neceſſary to be given on account of watchfulneſs, ſlight delirium, ſubſultus tendinum, or other ſigns of a preternatural irritability; and, as to wine, though half a pint in the day is a ſufficient allowance in moſt caſes, yet we are often obliged to increaſe it to double that quantity, and, with ſome particular patients, to a bottle in the twenty-four hours, which I ſeldom exceed, for the exceſs of a cordial ſtimulus may prove as fatal to the body as that of any other, (parag. 64.)

235. I have hitherto made no mention of antiſeptics. The uſe of theſe are, by practical writers, thought to be ſtrongly indicated, when ſymptoms occur that ſhow the diſeaſe to have become more of a putreſcent

trefcent nature, which naturally takes place in the advanced ſtage of almoſt every fever. Not that I diſcredit the uſe of antiſeptics, becauſe every tendency to putrefaction ought, no doubt, to be corrected. But, if theſe writers imagine that ſuch medicines directly correct an over putreſcency in the circulating fluids, they carry their idea of the power of antiſeptics too far, becauſe their operation is chiefly confined to their action in the primae viae. The bark, wine, and all the other cordials uſed in fevers, are certainly antiſeptics, and, of courſe, have ſome effect in correcting the putrid nature of the fluids in the alimentary canal. But the greateſt benefit derived from them is produced by their corroborating, cordial, and antiſpaſmodic virtues excited on the ſtomach and bowels, and by ſympathy communicated to the reſt of the ſyſtem. For, other medicines that appear, from experiment, to poſſeſs much ſtronger antiſeptic powers, are of little or no uſe in

fevers.

fevers *. Nay, the moſt eſſential ſervice we can render to the patient in this reſpect, is a ſcrupulous attention to cleanlineſs in the bed-clothes, in the room, and in every other article. Even two beds, where the room will admit of them, is of great ſervice, by enabling us to move the patient from the one to the other. A free circulation of freſh air ſhould be promoted in the apartment, and by this practice we remove a foul and putrid air, the retention of which often protracts the diſeaſe and increaſes the danger of it.

236. If a delirium, or a diſpoſition to it, comes on about the commencement of this fever, and there is reaſon to believe, from the ſtate of the pulſe, a ſlight degree of redneſs in the great canthi of the eyes, and other ſymptoms, that it ariſes from inflammation, or ſome tendency that way in the brain, we ſometimes, with other means, ſuch

* Vid. the Append. to Sir John Pringle's Diſeaſes of the Army.

ſuch as bleeding at the arm or jugular, bliſters to the head and back, &c. order topical bleeding by wet cupping or leeches to the temples, and they are frequently of ſervice in the removal of that dangerous ſymptom. But, when a delirium comes on at an advanced period of the diſeaſe, and, from the feebleneſs of the pulſe, clearneſs in the eyes, and other circumſtances, we have reaſon to ſuſpect that it proceeds from debility, an increaſed irritability, or from ſome foulneſs in the primae viae, then any evacuation of blood, even by cupping or leeches, conſtantly do harm. For this diminution of ſtrength is often increaſed by bleeding, and the patient ſhould rather be ſupported by the means mentioned in parag. 233.

237. I judge it unneceſſary here to take notice of ſuch accidental ſymptoms as ſometimes occur in the courſe of this, and almoſt every fever, but are not ſtrictly connected with them, and, of conſequence, are not conſtant

conſtant in their appearance, becauſe they uſually derive their origin either from a peculiarity in the conſtitution of the patient, or from ſome former diſeaſe with which he had been afflicted. The proper method of alleviating or removing theſe ſymptoms will naturally be ſuggeſted to the practitioner, after he has received the neceſſary information relative to their nature. There are likewiſe ſome circumſtances in the hiſtory and cure of this fever which would have admitted of ſome farther explanations, but are purpoſely omitted, as I ſhall have an opportunity of introducing them, with more advantage, in the account I am about to give of the nature and cure of another ſpecies of the bilious fever, ariſing chiefly from marſh miaſma, under the form of an intermittent.

SECTION

SECTION IX.

OF INTERMITTENTS.

238. I FORMERLY remarked, that the ſeveral cauſes of fevers, not ſpecific, ſeldom act ſingly on the ſyſtem, but in conjunction with others. In proportion to the prevalence of any one of them, muſt ariſe that variation in the form, ſo often obſerved in fevers, which in many circumſtances have ſo ſtrong a ſimilitude to each other, that they are allowed by practitioners to be only varieties of the ſame diſeaſe; and in no inſtance does this happen more frequently, than in thoſe fevers which de-

rive

rive their origin principally from marſh miaſma: For, even when this cauſe acts ſingly, the diſeaſe ariſing from it will vary in its malignancy, according to the quantity received into the ſtomach, its degree of activity, the habit of people expoſed to ſuch unwholeſome vapours, and the ſtrength of the conſtitution to reſiſt their effects. When, however, marſh miaſma is conjoined to a morbid ſecretion of bile, human contagion, catarrhal ſymptoms, and other cauſes capable of producing fever, it is reaſonable to ſuppoſe, from the great variety of combinations that may ariſe from them, aſſiſted by ſome peculiarity of conſtitution, that the form of the diſeaſe will vary in different perſons: But, as the action of ſeveral cauſes of fever on the ſyſtem are extremely ſimilar, if we ſhall be ſo fortunate as to give a juſt idea of the manner in which they produce their effects, the variety of ſhape in which they make their appearance will then admit of a more eaſy explanation. Not that I judge it neceſſary

to take notice of all the varieties which are to be obſerved in this ſpecies of fever; for whoever comprehends the action of the cauſes of this diſeaſe, under its moſt common appearances, will readily underſtand every variation from its uſual form. I ſhall therefore proceed to conſider only ſuch varieties of this fever as moſt generally occur; and, as the moſt ſimple, with reſpect to its cauſe, ſhall begin with an intermittent.

239. In the foregoing pages, on the ſubject of fevers, it has been frequently remarked, that the vapours ariſing from ſwamps, marſhy and fenny grounds, where dead vegetables, inſects, reptiles, and ſometimes fiſhes, corrupt and decay, are known to contain ſomething hurtful to the human conſtitution, which is termed marſh miaſma. As this miaſma is of a putrid nature, it may exiſt in the place from whence it ariſes, in various degrees of ſtrength, according to the climate, ſeaſon, and quantity of

of putrid vegetable and animal ſubſtances. Hence, in the cold or temperate regions, it is weaker, more diluted, and leſs powerful in its effects than in the more ſouthern countries, where, on account of its greater activity, agues become more and more intractable. As we approach the ſouth, and eſpecially within the tropics, they are in general of a malignant nature. This laſt ſpecies of ague, for the moſt part, commences in the form of a continued fever, and, according to the degree of heat which has preceded the attack, is always accompanied with a proportionable increaſe of the ſecretion of the bile: But, that we may the better underſtand the operation of the marſh miaſma, let us firſt take a view of the effects of the mildeſt ſort, which is capable of producing an intermittent.

240. In thoſe diſtricts which are remarkable for the production of agues, they uſually commence with the bilious autumnal fever, and are often connected with it: But,

But, when the remote cauſes of this laſt diſeaſe have not acted ſo powerfully as to give the approaching diſorder that particular type, and when the marſh miaſma appears to have been the principal remote cauſe, the diſeaſe then, in this country, generally aſſumes the form of an intermittent. But, ſome time before the acceſſion of the fever, the complexion is obſerved to become paler than uſual, the eyes are dull and heavy, the perſon complains of headach, want of appetite, and, from a languor and wearineſs, is leſs active than formerly, with other ſigns of ſome decline from his uſual health. At other times, though theſe ſymptoms of an approaching diſeaſe are always more or leſs diſcernible, yet they are not in ſome ſo conſpicuous as to give any alarm, and the perſon is taken as it were by ſurpriſe with a paroxyſm; the uſual phaenomena of which are, a laſſitude and wearineſs, and, from a general debility, there is a ſluggiſhneſs in his motions; he is ſeized with ſome uneaſineſs about the loins,

with

with pains, ſtretchings of his limbs, and yawning; he turns pale, complains of a coldneſs, particularly about the back, as if cold water was thrown on him. Theſe ſymptoms are accompanied with a head-ach, ſome degree of ſhivering, oppreſſion about the præcordia, nauſea, and ſoon after there is for the moſt part a vomiting of bile. The ſenſe of coldneſs becoming more general and ſevere, he is ſeized with a conſiderable tremor and ſhaking of the whole body, attended with a weak, quick, and irregular pulſe, a conſiderable thirſt, and a quick and ſometimes laborious reſpiration. After this ſtate of the paroxyſm has continued ſome time, the ſenſe of coldneſs gradually diminiſhes, and the perſon by degrees becomes warmer than natural, the face fluſhes, and the pulſe turns ſtronger, fuller, and more regular. When the body has continued in this condition for ſome time, a moiſture, and afterwards a ſweat, becomes general, with an abatement of the hardneſs and frequency of the pulſe, and

likewiſe

likewiſe of the heat and thirſt. From this period there is a gradual diminution of the febrile ſymptoms; and the ſweat being ended, leaves the patient free from fever, or in what is called a ſtate of apyrexia, though ſomewhat debilitated, from the effects of the preceding paroxyſm.

241. The time of this intermiſſion is various in different perſons. If, from the beginning of one paroxyſm to the commencement of another, there is a ſpace of twenty-four hours, the diſorder is called a Quotidian. But the moſt frequent form of an ague, in this country, is that of a Tertian, which takes up an interval of forty-eight hours. When the interval of a tertian is protracted a day beyond its uſual time, the diſeaſe gets the name of a Quartan; if two days, it is called a Quintan; and, if three, a Sextan. When theſe periods are interrupted, ſo that they cannot be brought under the above denominations, then the terms of Double Tertians and Double Quartans

tans are introduced. Authors have gone no farther in diſtinguiſhing the different intervals between the paroxyſms by particular names. Indeed, I think they have, in general, gone too far, in this and in many other inſtances, in their multiplication of names for the ſame diſeaſe. Nature is here rather uncivil to thoſe phyſicians who would ſplit hairs in their diſtinctions of the varieties of the ſame diſorder. They will inſiſt on tying her down to ſtated times and hours, with which ſhe ever has refuſed, and ever will refuſe, to comply. For theſe periodical returns are by no means ſo regular, the attacks of the fits being often from one to four hours before, and, at other times, as many hours after the uſual period of the former paroxyſms. Theſe diſtinctions, therefore, of intermittents, taken from the difference of their intervals, and ariſing from particular circumſtances, or a peculiarity of conſtitution, do not ſo much merit our attention as the periodical returns of the paroxyſms after a

ſtate

ſtate of apyrexia for a certain time, which is no doubt the moſt ſurpriſing circumſtance that attends an intermittent.

242. Although marſh miaſma is univerſally allowed to be the remote cauſe of certain fevers, particularly of the intermittent kind; yet I do not recollect to have met, in medical writers, with any ſatisfactory account of its operation, in producing thoſe morbid effects which bring on the acceſſion of the fever; nor do they give us the ſmalleſt information relative to the cauſe of the periodical returns of the paroxyſms, which can be relied on, with any degree of certainty. But, from the ſuppoſition I have regularly carried on, that the cauſes of fevers, which proceed not from cold, or inoculation, are taken into the ſtomach with the ſaliva, and ſupported it by many experiments (from p. 127—133 incluſive) moſt of the phaenomena of fevers, eſpecially of intermittents, will admit of an eaſy explanation; for, when the putrid exhalations from

from ſwamps are in their higheſt degree of activity, as in warm climates, their operation on the ſtomach, in producing nauſea and retchings, is felt almoſt immediately after they have been ſwallowed. What is more, when the perſon is moved to a healthier ſituation, and has a vomit given him within two or three hours of his firſt complaints, the fever is often totally prevented, parag. 126—133. But, in the colder regions, where the marſh miaſma is leſs powerful and leſs active, its effects take place more ſlowly, and are leſs perceptible, for ſome time, on the ſtomach and bowels, where, notwithſtanding, from the conſtant addition of this noxious vapour taken in with the ſaliva, it continues to act with a deciſive influence in changing the ſecretions in the primae viae, from a healthy to a morbid ſtate. Its action in this way being ſlow, its effects, for ſome time, are only obſervable by a want of appetite, indigeſtion, ſometimes a want of reſt, or at leaſt of that ſound refreſhing ſleep in the night the

perſons commonly enjoyed in health, and from the other ſymptoms which precede the paroxyſm. This diſeaſed ſecretion, however, ſtill ſubſiſts; and, together with the ſecreted fluids ſtagnating in the alimentary canal, augment at laſt to ſuch a quantity as is ſufficient to produce the cold fit, of which I have, in parag. 167. and from parag. 175. to 180. given ſome explanation. But, as the quantity of acrid bile, ſtagnating in the alimentary canal, is more conſiderable in this than in the catarrhal, or, for the moſt part, in the bilious fever, the ſymptoms of the cold ſtage run higher, and are more ſeverely felt in an ague, than they are on the acceſſion of either of theſe fevers.

243. In the cold fit of an intermittent, particularly that of the firſt paroxyſm, there is uſually a vomiting of a large quantity of phlegm and bile, ſuppoſed by ſome to be the effect, and nowiſe concerned as the cauſe of the cold ſtage: They imagine it

it to be emulged from the excretories of the glands of the primae viae and of the liver, by reaſon of ſome ſpaſmodic affection with which they are ſeized during this period. But the great quantity thrown up, and its offenſive ſmell and taſte, by no means favour ſuch a ſuppoſition. On the other hand, the general ſympathy of every part of the body with the firſt paſſages, is a ſtrong preſumption that the proximate cauſe of this diſorder originates from the phlegm and bile. Emetics, and other ſtrong ſtimulants, have effects on the ſtomach, and, of courſe, on the whole ſyſtem, ſomewhat ſimilar to thoſe which ariſe from the immediate cauſe of the cold fit of an ague. They bring on laſſitude, general debility, oppreſſion about the praecordia, nauſea, paleneſs, and cold ſweats, accompanied with a weak, quick, and irregular pulſe. But a vomiting coming on, carries off the offending matter; and, when no remarkable injury is done to the ſtomach, the effects juſt mentioned ſoon ceaſe. It is true that the general coldneſs,

the

the involuntary ſhaking of the limbs and trunk of the body, during the cold fit of an ague, riſe commonly to ſuch an height, that they may be ſaid to be peculiar to it. This may be owing to the nature of the ſtimulus, and to its extending through a conſiderable part of the inteſtines, and alſo to a preternatural irritability of their internal coat, from the diſeaſed ſtate of their glands.

244. Although the quantity of phlegm and bile in the ſtomach and bowels, on the acceſſion of the cold fit of an intermittent, is often leſſened by vomiting, and ſometimes by ſtool; yet the moſt conſiderable diminution is, by a quick abſorption of them, commencing with the acceleration of the pulſe after the attack of the paroxyſm. This is much facilitated by dilution, from the large quantity of thin drink the patient is prompted to take to allay his thirſt. But, as the quantity of acrid fluids in the primae viae is leſſened by this abſorption, which

which is ſo remarkable, as in ſome caſes to occaſion the drying up of ſores and bliſters during the continuance of the paroxyſm, the ſymptoms of the cold fit, by degrees, abate in their ſeverity. When theſe ſymptoms abate, the hot fit gradually commences. But, before it is completely formed, the patient now and then ſuffers a ſlight rigour or ſhivering from ſome portion of the phlegm and bile remaining in the alimentary canal; but, upon a farther diminution of them in the manner mentioned, theſe ſymptoms of the cold ſtage at laſt totally diſappear.

245. By this time the hot fit is completely formed; the pulſe is now more regular, fuller, and ſtronger, and the face fluſhes, with other ſigns of a general plethora. About this period the blood veſſels are ſurcharged with a quantity of fluids, ariſing from the great abſorption which has preceded, and ſtill continues to go on, from every cavity of the body, eſpecially from the

the ſtomach and bowels. This diſtenſion of the blood veſſels will naturally occaſion ſome degree of preſſure on the brain. Hence may ariſe the ſevere headach, delirium, or comatoſe ſtate, with which the patient, at this time, is afflicted. Not that I imagine theſe ſymptoms to be a conſequence ſolely of the plethora. The increaſed force of the arteries certainly have ſome ſhare in producing theſe effects, to which ſome degree of acrimony, in the circulating fluids, may alſo contribute. But the principal cauſe of them is, moſt probably, the febrile ſtimulus ſtill acting with a conſiderable force in the primae viae. This ſtimulus, in ſo far as it may depend on a quantity of acrid fluids in the alimentary canal, I have ſuppoſed to be gradually leſſening from the acceſſion of the paroxyſm, at which time its force was ſo conſiderable, as to give riſe to the ſeveral ſymptoms of the cold ſtage; during the continuance of which, there is ſuch an irregular diſtribution of the powers

of

of action, with a conſiderable diminution of the force of the arterial ſyſtem.

246. This laſt circumſtance is uſually the conſequence of the action of moſt ſtimuli when raiſed to a great height, which, in a leſs degree, increaſes the force of the heart and arteries in a remarkable manner. It is only by this way of conſidering the different effects of ſtimuli according to their degree of action on the ſyſtem, that we can account for the gradual increaſe of the ſtrength and regularity in the pulſe as the hot fit advances. Neither can we account for the circumſtance of a perſon eſcaping the cold fit of an intermittent, but on the ſuppoſition of there not being a ſufficient quantity or acrimony in the fluids, in the primae viae, to produce that effect. This often happens on a natural vomiting of phlegm and bile; but more frequently from an emetic given two or three hours before the expected return of the fit; and, when we are by that means ſucceſsful in clearing the

the ſtomach and bowels of their acrid contents, it ſometimes prevents entirely the coming on of the paroxyſm for that time; which circumſtance corroborates the general doctrine here given of the proximate cauſe of theſe fevers.

247. After the formation of the hot fit, there ſtill remains in the primae viae ſuch a quantity of acrid fluids, as are ſufficient to keep up a febrile ſtimulus on the ſyſtem, with a ſpaſmodic conſtriction of the veſſels of the ſkin for ſome time. But, on a farther diminution of theſe fluids, and of the febrile ſtimulus depending on them, the general ſpaſmodic conſtriction on the ſurface of the body, by degrees, goes off, a relaxation of the veſſels and excretories of the glands of the ſkin ſucceeds, an univerſal moiſture comes on, and terminates in a profuſe ſweat, which laſts ſome hours. By this evacuation, the diſtention of the blood-veſſels is gradually leſſened, a great part of the acrid fluids abſorbed by the lacteals during

ring the paroxyſm, is carried off by theſe and other emunctories, the urine depoſites a copious ſediment of a brick-duſt colour, which it probably receives from the bile; but, the febrile ſtimulus at laſt ceaſing, a complete intermiſſion takes place.

248. If the reaſons I have given for the ſeveral phaenomena of a paroxyſm are well founded, the periodical return of the diſeaſe cannot be of difficult ſolution. By the time the ſweating ſtage is finiſhed, I have ſuppoſed the acrid fluids in the alimentary canal, on which the febrile ſtimulus depended, to have been ſo far carried off by abſorption, that what remained gave little or no diſturbance to the ſyſtem. Although an intermiſſion takes place, yet, as the ſecretions in the primae viae continue in the ſame morbid ſtate, it is reaſonable to ſuppoſe, that the acrid fluids will again collect, after a certain interval, to ſuch a quantity as ſhall be capable of renewing the paroxyſm. This return, however, of the fit

with ſo much regularity, in twenty-four or forty-eight hours, as is commonly obſerved, has, next to the acceſſion itſelf, always been the moſt unaccountable circumſtance attending an intermittent. But, when we ſeriouſly conſider the great uniformity of nature in all her operations, it is eaſy to conceive, that near an equal quantity of bile and of the gaſtric fluids will be ſecreted in equal times; and when the patient gets over thoſe irregular returns of the paroxyſms, which ſometimes accompany an intermittent at its commencement, and the diſeaſe comes to aſſume the regular type of a quotidian, tertian, or quartan, then we ſay, that twenty-four, forty-eight, or ſeventy-two hours muſt elapſe, before that quantity of fluids, neceſſary to bring on a paroxyſm, can be ſecreted, or, that they can acquire, by ſtagnation and heat, the degree of acrimony requiſite to produce that effect. From this mode of reaſoning, the periodical return of the fit muſt appear leſs ſurpriſing. For, except ſuch caſes, in which

the

the ordinary courſe of the diſeaſe is interrupted by particular cauſes, the interval between the paroxyſms will be nearly equal, and even the paroxyſms themſelves will be nearly ſimilar to thoſe which have preceded, whilſt the general cauſes of the diſeaſe continues to act on the ſyſtem with the ſame force. A circumſtance which facilitates the return of the paroxyſms, and ſubjects aguiſh people to frequent returns of their diſorder, is, as formerly mentioned, that promptitude in nature to thoſe preciſe movements ſhe has been ſo much accuſtomed to raiſe in the body, when ſtimulated in a ſimilar manner with that which originally produced them. This frequent repetition of morbid movements, ſometimes begets ſuch an aptitude in the ſyſtem to a particular mode of acting, from ſlight cauſes, as can never be remedied.

249. Authors, and practitioners in phyſic, have, in all ages, remarked, ſuch a ſimilitude amongſt fevers in general, eſpecially

ally in thoſe of the bilious kind, with regard to their acceſſion, and to many other circumſtances attending their courſe, that they ſuſpected moſt fevers to have ſomething in common with reſpect to their cauſes, and, where theſe were eſſentially different from one another, they ſuppoſed their operation on the ſyſtem to be extremely ſimilar, as many of their effects on the body were nearly the ſame. But, as they traced not the cauſes of fevers to their ſource, and, conſequently, were unable to take any tolerable view of the manner in which they operate on the body, they remained ignorant of a number of circumſtances relative to fevers, and alſo of the reaſons of that ſimilitude in many particulars ſo obſervable amongſt them. Neither could any diſtinct account be given of the intimate connection which ſubſiſts between the ſeveral ſpecies of the bilious fever. They obſerved a continued fever of this kind, firſt to remit, then intermit, and, at laſt, to end in a dyſentery. Sometimes

theſe

theſe diſorders run in a contrary courſe, and, from obſervation, they knew, that, when a perſon was ſeized with a dyſentery, he eſcaped the fever, *et vice verſa*. But, how theſe changes and interchanges happened, or from what particular circumſtances they took their riſe, no tolerable reaſon was aſſigned.

250. In this uncertainty, with regard to the true nature of fevers, the cure has hitherto been conducted on the empyrical plan. It is from the experience of former ages, of which there remains many valuable precepts, together with a number of uſeful obſervations by the moderns on this ſubject, that our moſt approved methods of the cure of fevers has been derived. In this particular, experience alone has ſupported the credit and character of the phyſician, and is a proof how far obſervations, made by men of judgment and good ſenſe, will ſometimes conduct them to the moſt effectual means to be uſed in the recovery

of

of the ſick, without having any diſtinct notion of the original cauſe of the diſeaſe, or of its operation on the ſyſtem. For, neither the hiſtory of the diſeaſe, nor the effects of particular remedies in the cure, would admit of explanation on any theory that had hitherto been given.

251. The theory of fevers delivered in the preceding ſections deſerves ſome credit, on account of its ſimplicity. It is eaſily comprehended, and not liable to the ſeveral objections juſt mentioned; becauſe, from it moſt of the phaenomena of fevers may be explained, the chief circumſtances in which they differ, and the connection which the ſeveral forms of the bilious fever have with one another, are readily underſtood. Theſe are, no doubt, ſtrong proofs in favour of the preceding doctrine. But the ſtrongeſt evidence that can be given of its truth, will naturally ariſe from a conſideration of the operation and effects

of

of the medicines uſed in the cure of thoſe fevers.

252. In the preceding ſection I have given my reaſons for ſuppoſing, that more or leſs of a catarrhal diſorder accompanies the common form of the bilious fever. The leſs theſe catarrhal effects prevail, the ſooner the fever remits or intermits; and when it comes to have regular intermiſſions, I then imagine the effects of the cold, by keeping up a preternatural irritability of the ſyſtem, have, in a great meaſure, ceaſed; for, while this irritability continues, no diſtinct apyrexia takes place. I have reaſon to believe, that, when the morbid ſecretions ariſe to an extraordinary height, it has the ſame effect on the body in increaſing the irritability of the ſyſtem, and in continuing the fever, as the cattarrhal effects juſt mentioned. This I ſuſpect to be the caſe in moſt of the marſh fevers, which generally proceed in the form of a continued or remitting fever for ſome time. But thoſe of

a

a leſs malignant nature, deriving their origin chiefly from marſh miaſma, ſooner intermit. Few of them, at firſt, are regular as to the intervals of the paroxyſms, becauſe of the very irritable ſtate of the body, and the extraordinary quantity of acrid fluids in the primae viae at that time, but are ſoon brought to more regular intermiſſions, by evacuating the ſtomach and bowels of their contents.

253. This is the firſt indication of cure to be attended to, chiefly during the ſtate of apyrexia, by a proper exhibition of tartar emetic, calx antimonii compoſita, ipecacuan, ſacred elixir, tincture of rhubarb, tincture of ſenna, infuſion of ſenna, polychreſt, Rochelle, and Glauber ſalts, or by medicines compoſed of theſe, according to the circumſtances of the caſe, and intention of the preſcriber. When theſe evacuations have been carried on with judgment for two or three times, the ſtate of apyrexia becomes more perfect, the paroxyſms

are

are more regular as to the time of their return, and in ſome caſes they are ſtopt for ſeveral days, or altogether: But the moſt frequent conſequence of this treatment is to bring the diſeaſe to be milder and more regular in its type.

254. Our next indications of cure are, firſt, to remove the preternatural irritability of the ſyſtem, which ſtill ſubſiſts during the continuance of an intermittent, though not always to ſuch a degree as to prevent the ſtate of apyrexia from being complete; ſecondly, to rectify the morbid ſecretions in the primae viae, and thereby to prevent a return of the paroxyſms; and, thirdly, by ſtrengthening the ſyſtem to ſecure the patient from the danger of a relapſe.

256. As the preternatural irritability of the ſyſtem commonly abates by a proſecution of the general plan of recovery in intermittents, we ſeldom have occaſion to pay

any particular attention to this circumſtance; but, in certain caſes, where this morbid irritability riſes during the paroxyſm to a remarkable height, and the febrile ſtimulus acts in conſequence on the primae viae with a proportionable increaſed force, it thereby often proves the cauſe of violent headachs, delirium, and other complaints. This obliges us to have recourſe to ſuch means as leſſen the irritability of the ſyſtem; and, on theſe occaſions, laudanum effectually anſwers our purpoſe, when given from twenty-five to forty drops in a draught immediately on the acceſſion of the cold fit. By this medicine thoſe diſagreeable ſymptoms are, for the moſt part, not only prevented, or conſiderably abated in their violence, but the fit itſelf is in general rendered milder; and there are many inſtances of the patient's eſcaping the paroxyſm altogether by this preſcription. The beneficial effects of laudanum in intermittents, for the above complaints, were firſt accidentally diſcovered by Dr Lind of

Haſlar

Haſlar Hoſpital; and, in ſo far as our view may be, merely to leſſen ſuch a degree of irritability as is apt to produce violent and uncommon ſymptoms, it is a valuable medicine: But if, from the ſucceſs ſome practitioners have had, in ſtopping a few paroxyſms of a ſlight intermittent by its uſe, they ſhould carry their idea in favour of opium ſo far as to imagine that they may practiſe with it alone, they will in many caſes find themſelves miſtaken. For, if the cauſes of intermittents exiſt in the body in the manner I have endeavoured to ſhow in this and the preceding ſections, then it will evidently appear, that an indiſcriminate uſe of opium muſt frequently be attended with bad conſequences.

257. At the commencement of an intermittent, after the uſual evacuations have been made, it is a common practice to begin the cure with ſaline draughts, the *decoctum febrifugum* of the military hoſpitals, bitter infuſions, and laxatives, and, in ſome ſlight

ſlight caſes, with ſucceſs. But the medicines which have been found moſt effectual, are ſuch as, by their known properties, have a more direct influence in rectifying the morbid ſecretions in the alimentary canal. Theſe commonly conſiſt of vegetable ſtomachic bitters, aromatics, and aſtringents, of which there are recommended by authors a great variety of formulae. But, from the experience of phyſicians for many years paſt, it is univerſally known, that the Peruvian bark, when properly adminiſtered, is ſuperior in its effects to all the other medicines given in this diſorder.

258. It is ſucceſs alone that has eſtabliſhed the general practice of giving the Peruvian bark in intermittents, and not from a particular knowledge of its manner of operating on the ſyſtem, or from a diſtinct idea of the cauſe of this diſeaſe, neither of which have hitherto been well underſtood. The whole of the ſtomachic ſimples uſed by phyſicians, in the debilita-

ted

ted ſtate of the ſtomach and bowels, poſſeſs more or leſs a bitterneſs and gentle aſtringency, and ſome of them have an agreeable aromatic taſte and flavour. Their ſalutary effects conſiſt in increaſing the appetite and digeſtive powers, by reſtoring to the nerves thoſe conditions they poſſeſſed in a healthy ſtate; and, as they recover their ſtrength, the ſyſtem becomes leſs irritable, and the ſecretions, of courſe, return by degrees to a healthy ſtate. It is perhaps in this manner we are to account not only for their effects in the cure of intermittents, but even for thoſe of the bark, the peculiar bitterneſs and aſtringency of which are moſt ſingularly adapted for ſtrengthening the nerves of the primae viae, and, of courſe, thoſe of the whole ſyſtem. Beſides, theſe qualities of the bark are more permanent in the ſtomach and bowels than thoſe of any other ſimple or compound of the ſame claſs of medicines we are yet acquainted with; all of which have, in a ſhort time, their medical virtues much weakened

kened by the force of our digeſtive powers. But this is not the caſe with the Peruvian bark; for, although it yields its properties to the ſame powers, yet it poſſeſſes them in ſo remarkable a degree, that it is a difficult matter completely to exhauſt it of them; by which means, the corroborating qualities of the bark are continued in their full force, and nearly in an equal manner, through the whole of the alimentary canal, as frequently appears from its being thrown up by vomiting, ſome days after it has been taken, very little altered in taſte or ſmell from what it was when firſt ſwallowed. It is only in this way of conſidering the properties of the bark, its operation and effects on the body, that we can have any tolerable idea of the manner in which the beneficial conſequences of its uſe are brought about, in all ſuch diſeaſes as take their riſe from a diſeaſed and debilitated ſtate of the nervous ſyſtem.

259.

259. The time of giving the bark with the greateſt ſucceſs in intermittents, is during the intermiſſion. We ſucceed beſt when it is given in ſubſtance, and in ſuch a form as may be moſt agreeable to the patient, beginning the firſt doſe about the end of the ſweating ſtage of the paroxyſm. Our rule for the doſe and repetition of it ought to be, not to exceed that quantity which the ſtomach can eaſily bear. An error in this reſpect is always attended with bad conſequences, from its creating ſickneſs and vomiting, and ſometimes a looſeneſs. But the worſt circumſtance is, that patients take ſuch a diſlike to this medicine, that it is often with the greateſt difficulty they can conquer their averſion to it; and, with ſome, this averſion is carried ſo far that they refuſe to take the bark in any form in which it can be given. Our not paying a proper attention to this circumſtance, is frequently the cauſe of that want of ſucceſs ſo often met with in the cure of intermittents; for, when the ſtomach is oppreſ-

ſed

ſed with a quantity of bark, it cannot act as a corroborant. On the contrary, the appetite and digeſtion fail, with other ſigns of a debilitated ſyſtem; becauſe ſtimuli, even of the moſt ſalutary kind, when carried to exceſs, always do harm, and have often different effects from thoſe which attend the moderate application of them. I do not mean, by this way of reaſoning, to preclude myſelf or others from every benefit that can be derived from the uſe of the bark, in every diſorder in which it may be given with advantage; I only wiſh to guard againſt the abuſe of it. A perſon, ill of a remitting fever, cannot take ſuch a quantity of the bark, in the ſame ſpace of time, that may be given to another during the intermiſſion of an ague; becauſe, in this laſt caſe, the febrile ſtimulus is as it were ſuſpended for a time, and, of courſe, the ſyſtem is leſs irritable: And it is known, that ſtill larger quantities of the bark may be given in the ſame ſpace of time, with the greateſt ſucceſs, in ill-conditioned

ditioned fores and mortifications, when no proper febrile ſtimulus exiſts in the habit.

260. The firſt doſes of the bark I preſcribe, during the intermiſſion of an ague, uſually conſiſt of half a drachm of the powder in a draught or bolus every two or three hours. This doſe is gradually increaſed to two ſcruples, and ſometimes to a drachm; but I ſeldom exceed that quantity. Making an allowance for the time of ſleep, and of the cold and hot fits of the paroxyſm, when this medicine is intermitted, we ſeldom can get our patients in quotidians to take above half an ounce or ſix drachms of the bark in twenty-four hours; but in a tertian, by much the moſt frequent form of an intermittent, an ounce may in general be taken during the intermiſſion. It is not uncommon for the ſick to ſhow a reluctance to the bark when ſo often preſented to them. In this caſe it is proper for the phyſician to inform himſelf whether the averſion ariſes only from the ge-

neral diſlike many perſons have to every kind of medicine, or from the ſtomach being oppreſſed with too large a quantity of the bark. In this laſt caſe, the doſe muſt be leſſened, or the ſame doſe is often brought to ſit lighter, by giving it in two or three ounces of Madeira or other ſtrong wine; and, with thoſe who cannot afford to purchaſe them, the ſame quantity of diſtilled ſpirits and water, made equal in ſtrength to Madeira, anſwers the ſame intention. By proceeding in this way to give as much of the bark as can be taken without oppreſſing the ſtomach, the paroxyſms, in moſt caſes, become milder, ſomewhat irregular, and at laſt ceaſe. But, notwithſtanding this appearance of the cure of intermittents, to ſecure the patient againſt the danger of a relapſe, it is neceſſary to continue the uſe of the bark, diminiſhing gradually the quantity of it, till the patient's health is fully eſtabliſhed.

261.

261. The time taken up in the cure of an intermittent is various. It depends on a number of circumſtances, as, the primae viae being cleared of viſcid phlegm and bile, before the bark is given; the capability of the perſon to take the neceſſary quantity of bark; the apyrexia being more or leſs complete; the degree of irritability on the ſyſtem; and a variety of other circumſtances obſerved during the courſe of the diſeaſe. A vomiting or looſeneſs, whilſt the patient is taking the bark, may proceed from over-doſing, or from an uncommon irritability in the alimentary canal: But, in either caſe, it is neceſſary to ſtop theſe evacuations, which protract the diſeaſe by carrying off the bark too quickly.

262. Although, from the view we have taken of the nature and cauſe of this diſeaſe, and of the operation of the bark on the ſyſtem in the cure of it, we muſt conſider this medicine as the moſt powerful

febrifuge

febrifuge hitherto known; yet it ſometimes happens, that we fail of ſucceſs in the cure of intermittents, though the bark has been given in large quantities and for a conſiderable time. This want of ſucceſs, I apprehend, may be owing to ſeveral cauſes, but chiefly to a want of attention to the circumſtances mentioned in the preceding paragraph. It is this inattention to thoſe impediments to the cure, and to the means of removing them, which is for the moſt part the reaſon why, in particular caſes, the bark does not act with its uſual influence on the cauſe of the diſeaſe; the conſequence of which is, that, by the frequent repetition of the paroxyſm, the ſyſtem becomes exceedingly moveable. Hence the fits are renewed from very ſlight cauſes, and the diſeaſe is protracted *. Beſides, the

* A gentleman, forty-two years of age, who had always enjoyed a tolerable ſtate of health, though rather of a delicate than robuſt conſtitution, was, in autumn 1750, ſeized with an intermittent, in the form of a tertian,

the ſtomach and bowels being habituated to the ſtimulus of the bark, from its long and continued uſe, its effects on the ſyſtem become extremely feeble, and inadequate to

tertian. This diſeaſe apparently left him in a few weeks. But, by an injudicious treatment of it, the paroxyſms returned, in an irregular manner, for a conſiderable time. In leſs than a year from the commencement of this intermittent, he became, in a remarkable degree, ſubject to returns of it. Not only the common cauſes of cold and damp weather, &c. brought on a relapſe of the ague, but the leaſt error in diet was immediately followed by the ſame bad effects. He has frequently been attacked with a paroxyſm in five minutes after he had taken certain articles of diet, which particularly diſagreed with his ſtomach; and the propenſity to ague fits became, at laſt, ſo ſtrong, that he was often ſeized with them inſtantly after waſhing his hands in cold water. Theſe, in general, run on to four or five fits of a quotidian or tertian, before the diſorder left him for that time. He uſually enjoyed a tolerable ſtate of health during the intervals of his illneſs, which were ſeldom above three weeks or a month, though they were ſometimes protracted to three or four months, and, in this way, he continued for eighteen years, when he died of a diſeaſe perfectly different from the

to the cure of the diſorder, even when it has become milder, and thoſe obſtructions to the cure have been partly removed.

263. In ſuch caſes, where the bark has failed, the diſeaſe ſubſiſting more from an exceſs of irritability in the ſyſtem than from the morbid ſecretions exiſting in any remarkable degree, noſtrums come in for a conſiderable ſhare of credit in the cure of this diſorder, as bitter ſtomachic infuſions, tinctures, powders, and electuaries, of various

the intermittent, which had afflicted him for ſo long a time. This caſe is one of many which might be given as proofs of the very ſtrong propenſity, that often prevails in the ſyſtem, to a particular mode of action, when any ſtimulus, which uſually acts in a general way, is applied to it, eſpecially if it proceeds from the ſtomach or bowels. Indeed, it is only in this way of conſidering our ſubject we can poſſibly account for thoſe paroxyſms which are ſaid to return at the diſtance of ſix, ſeven, or twelve months. They are, in general, owing to indigeſtion, a cholera, or to ſome other accidental cauſe, in perſons who had formerly been afflicted with agues.

rious ſorts, cordials, antiſpaſmodics, aſtringents, and laxatives; all of which medicines have been ſucceſsful in the cure of intermittents. But, as we were ignorant of the true nature of this diſeaſe, the manner in which theſe remedies operated on the body, in producing their ſalutary effects, was likewiſe unknown. What added to our difficulty in reaſoning on the cure of this diſorder, was the different, and ſometimes oppoſite, qualities the medicines poſſeſſed, that were uſed with ſucceſs in the recovery of the ſick. But, from the foregoing view of this diſeaſe, and of the different circumſtances under which it may exiſt, I imagine, that the manner in which theſe different remedies prove ſucceſsful in the cure of intermittents will now be better underſtood. I ſhall give a few examples, by way of illuſtration.

264. Dr Saunders was conſulted by three officers, who were ill of an ague, caught at the Havanna, upwards of ſeven months before

before this application for advice. Two of these Gentlemen, with a servant about thirteen years of age, having, at the same time, a diarrhoea, the Doctor gave each a dose of tincture of rhubarb, about seven hours before the paroxysm was expected, with a view to moderate the looseness. But he was surprised, that, by its operation as a cathartic, it stopped the fits, which considerable quantities of bark, taken at the Havanna in North America, and on their voyage home, were not able to accomplish *. He afterwards tried the same experiment, successfully, with several obstinate intermittents. And Mr Drummond, surgeon to the second batallion of Royal Highlanders, hearing of Dr Saunders's practice of giving tincture of senna and rhubarb about seven hours before the coming

* This diarrhoea appears evidently to have derived its origin from the same acrid fluids in the primae viae, which had given rise to the paroxysms.

ming on of the paroxyſm, tried it on himſelf, and thirty ſoldiers, with ſucceſs*.

265. This ſimple method of curing chronic agues, which have reſiſted the power of the bark, deſerves particular attention. It not only explains the reaſon of the want of ſucceſs that ſo often attends the improper exhibition of the bark, as mentioned in parag. 260. but ſerves alſo to throw conſiderable light on the true nature of this diſeaſe. A gentle purging draught of tincture of rhubarb and ſenna, given ſeven or eight hours before the expected paroxyſm, at the commencement of an intermittent, has very little effect in the cure of that diſeaſe. In ſo far as ſuch a draught may free the alimentary canal of viſcid phlegm and bile, it may contribute to render the ſucceeding fit milder. But, as the cauſe of the diſeaſe ſtill acts in the body with conſiderable force, and the ſecretions are conſe-

* Sir J. Pringle's Med. Annot. vol. vii. p. 63. MS.

quently in a morbid ſtate, the paroxyſms will return. But, when the diſeaſe has continued for a conſiderable time, and ſubſiſts more from an uncommon irritability in the inteſtinal tube, than from any other circumſtance, then we can readily perceive how the clearing of the primae viae of a collection of acrid fluids, previous to the uſual time of the expected fit, ſhould prevent its return. Nay, if this purging draught is repeated three or four times, ſo as to carry off the acrid contents of the bowels before they are accumulated in ſuch a quantity as is ſufficient to produce a paroxyſm, it may prove effectual in the cure of this diſeaſe. For nothing keeps up the debility and preternatural irritability of the body, more than a frequent repetition of the paroxyſms; and, of courſe, when the patient eſcapes his uſual fits for eight or ten days, it often happens, that the ſyſtem recovers ſo remarkably from its former morbid condition, as to be able to reſiſt ſuch ſtimuli as were capable, in its more

diſeaſed

diſeaſed ſtate, of producing a paroxyſm. The ſucceſsful treatment of chronic agues with flowers of brimſtone, after the bark and other medicines had failed, by giving them in ſuch a quantity as to keep up a moderate looſeneſs, is a confirmation of the above reaſoning on the cure of this diſeaſe by laxatives *.

266. A contrary practice with aſtringents has been ſometimes followed with ſucceſs. A ſolution of alum in brandy, with a little nutmeg, or ſome other aromatic added to it, and given immediately before the time of the paroxyſm, has, I have been told, prevented the fit from taking place, and, by repeating this draught, in the ſame manner, two or three times, has cured ſome intermittents. When ſuch medicines have proved ſucceſsful, it has probably been in chronic agues, under ſuch circumſtances as are mentioned in the preceding

* Med. Annot. vol. viii. page 236.—239.

ceding paragraph. The ſalutary effects of this remedy muſt be aſcribed to its aſtringency and cordial quality, which give ſuch a ſtability and firmneſs to the nerves, as enables them to bear the ſtimulus of thoſe acrid fluids which uſed formerly to produce a paroxyſm. Such a practice, however, could never become general, becauſe the whole of this ſolution being ſoon abſorbed, its effects on the ſtomach and bowels would be leſs permanent than thoſe of the bark, or even medicines of inferior virtues.

267. It is a fact, that opium or laudanum, given in a proper quantity, immediately before the acceſſion of a paroxyſm, will ſometimes prevent its return for that time (p. 257.) But ſo extraordinary an effect of laudanum has been thought ſomewhat unaccountable. It may, however, be eaſily underſtood; for, if we allow, that, by reſtoring to the nerves their uſual firmneſs and ſtability, fits may be prevented, when

when the return of paroxyſms depend on an uncommon irritability of the ſyſtem, we can readily comprehend, that a doſe of laudanum, given immediately before the commencement of the cold fit, will, by leſſening the irritability for a time, have the ſame effect in preventing the return of the paroxyſm, eſpecially if the diſorder is of a ſlight nature. But this method of cure can ſeldom be proſecuted with advantage; for, as opium has no other effects than as a cordial and ſedative, the body, continuing in the ſame debilitated ſtate, will ſubject the patient to a return of his diſorder. In ſpeaking of the cordial qualities of opium, this muſt only be underſtood to take place when a moderate quantity is given; for large doſes have a contrary effect, and always leave behind them a conſiderable debility, with other diſturbances of the functions.

268. Several noſtrums uſed in the cure of intermittents, appear to act on the ſyſtem by their antiſpaſmodic qualities. As

a cordial and antiſpaſmodic in fevers, camphire is unqueſtionably one of our beſt remedies. In the low, malignant, remitting, or intermitting fevers of autumn, in the neighbourhood of marſhes, camphire, joined with the Peruvian bark, is given with the greateſt advantage. Some chronic agues, after they have been removed, leave ſuch a mobility in particular parts of the body, as ſubjects the perſon to periodical pains, ſhakings, or partial convulſions, ſimilar to the paroxyſms of an intermittent. When theſe anomalous complaints derive their origin from the common cauſes of an ague, the clearing of the primae viae by an emetic and laxative, and afterwards giving the bark, commonly removes the diſorder. But it ſometimes happens that theſe diſeaſes are merely ſpaſmodic, and are owing to cauſes different from thoſe which originally produced the intermittent. In ſuch caſes, the bark uſually fails of ſucceſs; but the diſorder is readily cured by antiſpaſmodics, and particularly by camphire.

269.

269. It is true, that this antiſpaſmodic quality of camphire has been generally known for many years. The experience of Hoffman eſtabliſhed its character. From experiments made on camphire, by diſſolving it in any of the foſſil acids, ſpirit of wine, or oils, after it is recovered by the addition of water, it is found to be the ſame camphire, unchanged in its principles; and, as it may be ſublimed numberleſs times in cloſe veſſels, without producing the ſmalleſt decompoſition of its ſubſtance, or alteration of its properties, we may, with great probability, conclude, that it is unalterable by our digeſtive powers; and, of courſe, that its effects on the ſyſtem will be permanent and uniform, while it continues in the primae viae, which is far from being the caſe with moſt of the other antiſpaſmodics. But the doſes of camphire uſually given, have hitherto been too ſmall to ſhow its full powers in obſtinate caſes, and the ſtrong ſedative effects of half a drachm of camphire taken by Dr Alexander, may have check-

ed

ed the courage of practitioners in going so far as we know may be done, not only with safety, but advantage; for, by gradually increasing the dose, it may be raised to 14 or 15 grains thrice a-day.

270. When the composition and qualities of other remedies given with success in an ague, are known, the manner in which they operate on the body, in the cure of that disease, may, from the explanations already given on this subject, be readily understood. To avoid, therefore, being tedious, I shall only remark, that the few observations made on the seemingly contradictory practice of curing the same disorder by laxatives, astringents, sedatives, and stimulants, serve to illustrate the true nature of an intermittent. They corroborate the preceding doctrine concerning the original cause of the disease, the explanations given of the periodical return of the paroxysms, after a state of apyrexia for a certain time, and show the different circumstances

ſtances under which the diſorder may exiſt. Indeed, the whole of the cure of this diſeaſe, under the various forms in which it appears, throw conſiderable light on every part of this ſubject, and explains moſt of the phaenomena that attend the diſorder in its ſeveral ſtages, and in different patients.

271. When the rich inhabitants of marſhy grounds, or ſtrangers arrived amongſt them, are ſeized with intermittents, they ought to remove, as ſoon as poſſible, to drier and better ventilated ſituations, at a diſtance from thoſe putrid exhalations which gave riſe to their diſeaſes. By this removal to a more healthy air, their diſorders are more eaſily and ſpeedily cured. But this is an advice which cannot be followed by the poor, whoſe indigent circumſtances preclude them from thoſe advantages, and oblige them to ſubmit to the ordinary courſe of the diſeaſe. It would be of great benefit to the inhabitants of marſhy countries,

in the preſervation of their health, could they be properly impreſſed with the importance of cleanlineſs in their perſons and in their houſes, and to render their habitations as dry as their ſituations will permit. Such people being kept open in their bodies by ſome gentle laxative, during the whole of the ſickly ſeaſon, is of the greateſt advantage. The chewing of the bark as a corroborant, is an excellent preſervative againſt marſh fevers, as is a glaſs of the ſtomachic tincture of the bark taken once or twice a day. But theſe ſubjects have been ſo fully treated of by various authors, that I judge it unneceſſary to enlarge upon them. Neither ſhall I inſiſt on the articles of diet and exerciſe, as the advantages ariſing from a proper regulation of them are ſufficiently known to every practitioner.

FINIS.